Price 35 cents

Chemical Week

July 19, 1958

Farm chemicals survey: Fertilizer sales surge, but pesticide sales are spotty . . p. 23

Four-in-one vaccines move onto market. Broader-spectrum antigens ahead . . p. 62

Swimming-pool chemicals make $22-million specialties splash . . . . . p. 69

Chlorate capacity climbs, as increasing use in paper and rockets spur expansion . p. 91

CW Report
Page 47

A McGRAW-HILL PUBL

Newest idea in sub-floor construction reduces dead weight up to 75%!

Westvaco® MgO

ULW Sub-floor Construction
with Communication Raceway

Only 7–7½ lbs. p.s.f. in 3–5" thickness, this Ultra Lightweight Floor*. . . originated by E. H. O'Neill Floors Company . . . saves structural steel and increases floor loading limits!

The ¾" basecoat topping of oxychloride cement based on Westvaco MgO withstands all floor loading requirements in institutional, commercial and residential construction. Beneath it, a light core of rigid foamed plastic simplifies installation of communications and electrical systems and provides thermal insulation. Other plus values are reduced sound transmission and easier tread.

This is an outstanding example of how progressive manufacturers are putting Westvaco MgO to work in new and unique applications. For further information write E. H. O'Neill Floors Company, 2525 So. 50th Ave., Cicero 50, Illinois for specification #45CW.

For information on our diverse line of MgO products, contact Westvaco.

*patent applied for

Putting Ideas to Work

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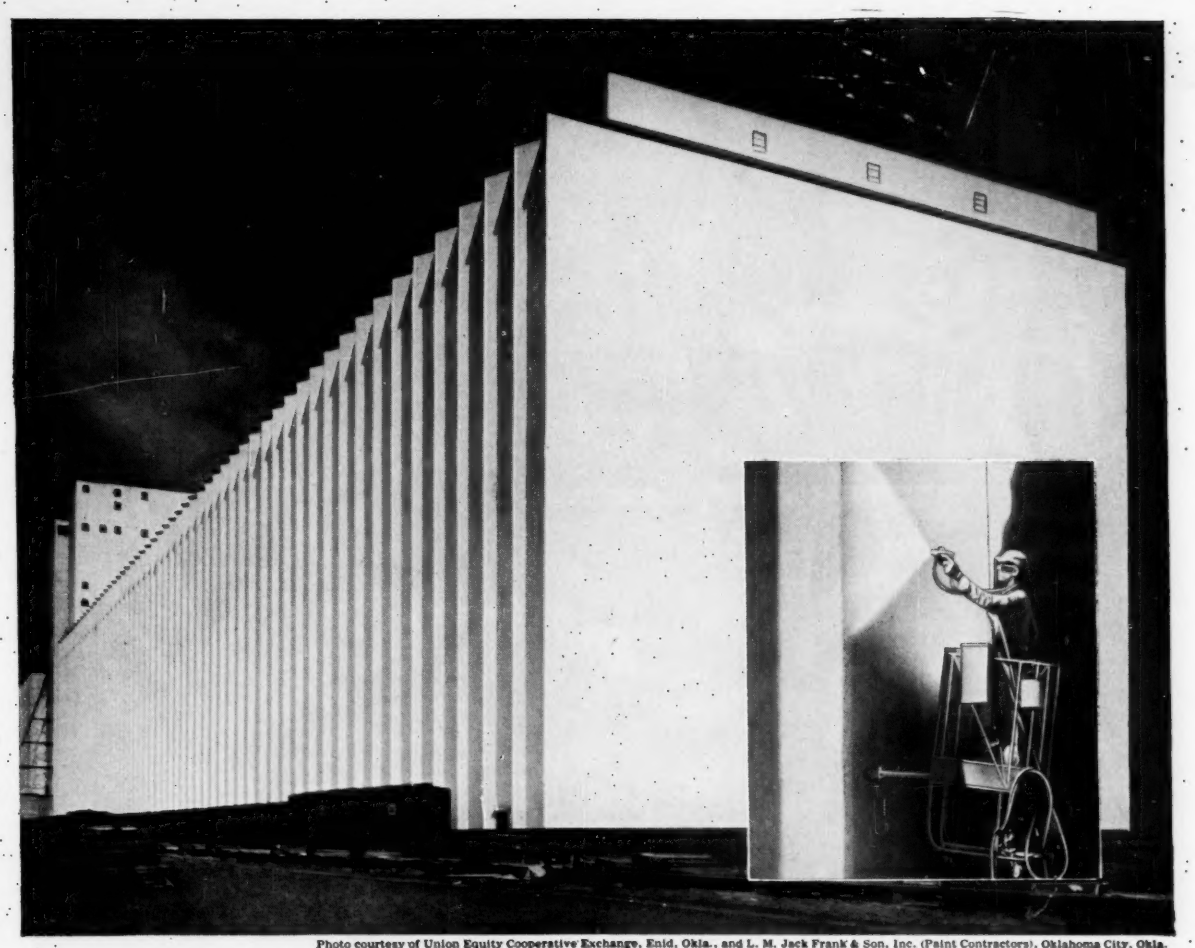


Photo courtesy of Union Equity Cooperative Exchange, Enid, Okla., and L. M. Jack Frank & Son, Inc. (Paint Contractors), Oklahoma City, Okla.

How to protect and beautify a large investment

That was the order: Paint the exterior of one of the world's largest grain elevators. And be sure of the maximum return on an investment in over 5,000 gallons of paint, plus the cost of many hours of application.

The basic problem lay in combating the alkalies and moisture found in all concrete which can attack and destroy ordinary paints in a few short months. But the problem was complicated further by exposure to extremes in weather, plus the need for spraying the paint under high pressure.

The lasting solution was found in a masonry paint especially formulated by Pratt & Lambert–Inc., and based on PLIOLITE S-5. Paints made with PLIOLITE S-5, in over 12 years of wide use, have fully proved their lasting beauty through outstanding resistance to moisture, alkalies and weather. And they are easy to apply, dry rapidly, maintain uniform color and always provide an excellent surface for repainting.

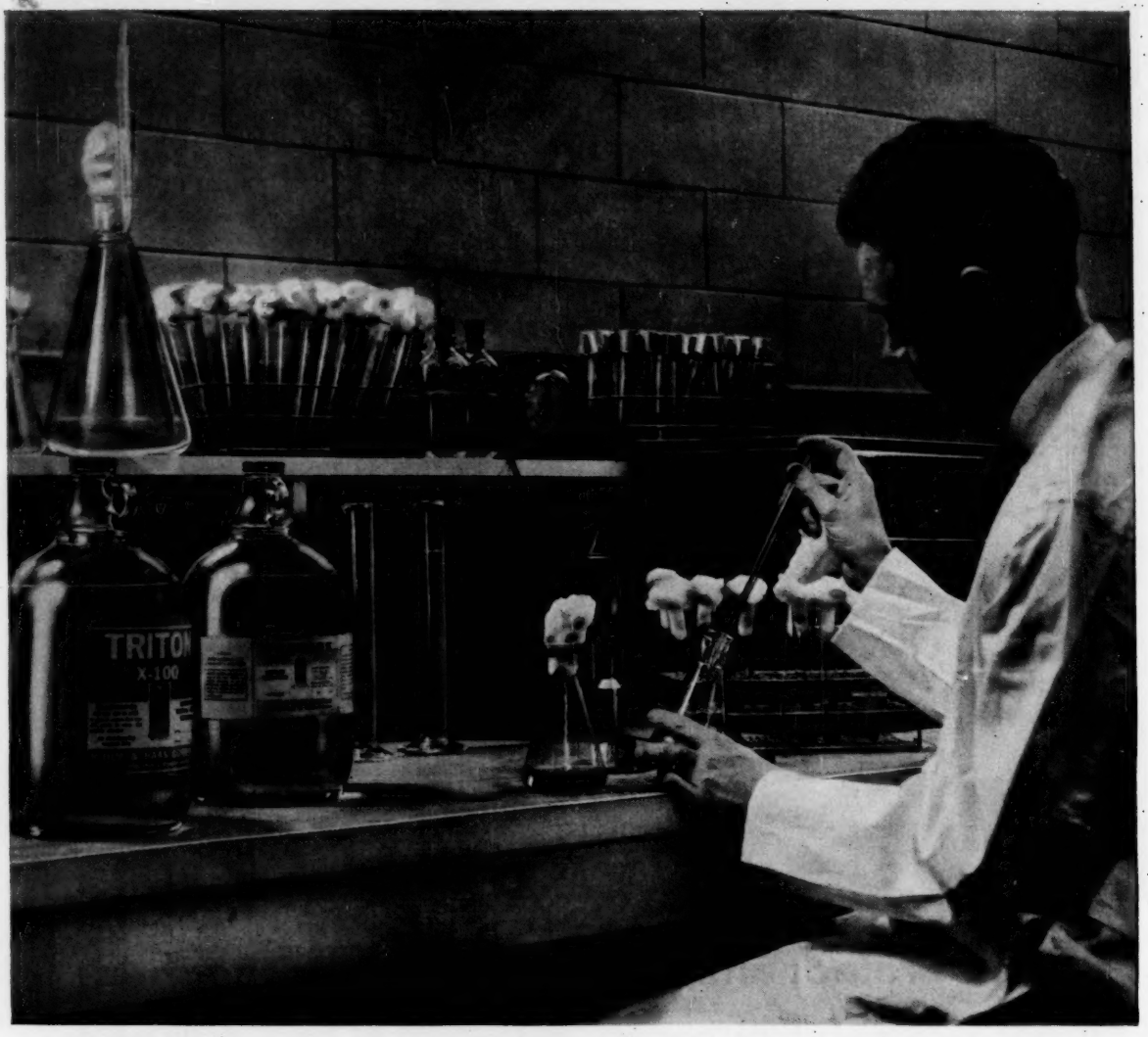
If you have a similar paint order to fill–or any need for a readily soluble, unusually chemical-resistant resin, why not learn more about PLIOLITE S-5? For details, including the latest *Tech Book Bulletins*, write: Goodyear, Chemical Division, Dept. S-9417, Akron 16, Ohio.

GOODYEAR

60 YEARS 1898–1958 ANNIVERSARY

CHEMICAL DIVISION

Pliolite–T.M. The Goodyear Tire & Rubber Company, Akron, Ohio



The Right COMBINATION for Better Sanitation

Now . . . build sales-winning performance into your detergent-sanitizers by including TRITON X-100 detergent and new HYAMINE 3500 germicide in your formulations.

TRITON X-100, an alkyl aryl polyether alcohol, imparts superior hard surface detergency . . . excellent grease emulsification . . . and free rinsing.

HYAMINE 3500, a 50% aqueous solution of a new, selected blend of alkyl dimethyl benzyl ammonium chlorides, gives you high germicidal activity in hard water. In use solutions it is an effective bactericide, sanitizer and deodorant in waters containing up to 550 ppm hardness. Alkaline-built detergent-sanitizers are effective in waters up to 1250 ppm hardness.

Write for test samples, additional information, or help in formulating a liquid or powdered detergent-sanitizer with TRITON X-100 and HYAMINE 3500.

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Chemical Week

TOP OF THE WEEK

JULY 19, 1958

"Sell" your plant to the community, if you want high morale. Westvaco's plan for Charleston, W. Va., gives some tips on how to go about it ..... **p. 33**

When does technical servicing stop paying off? Carbide's Steele tells how he evaluates it ..... **p. 41**

Pure metal powder, welded-pellet electrodes are keys to National Research's ultrapurity tantalum process ..... **p. 97**

13 VIEWPOINT
Justice Dept. antitrust suits against CPI companies seem to indicate an unfamiliarity with the practicalities of business.

14 OPINION

19 BUSINESS NEWSLETTER

23 Late-spring buying boom pulls fertilizer sales up to last year's level; further gains predicted for crop-year just beginning.

25 Lever Bros. and Monsanto map fight against new antitrust suit over low-suds detergent contract; government wants marketing rights transferred to a smaller firm.

25 Plugs by investment houses, good spring sales, new resin for rockets and merger rumors incite price-boosting scramble for Reichhold stock.

26 U.S. plastics industry executives—just back from 4-week tour—tell of Russia's efforts to gain world leadership in polymers.

26 Following Du Pont's cancellation of urethane royalty contracts, Mobay revises licensing program for polyurethane foams.

29 WASHINGTON NEWSLETTER

33 ADMINISTRATION
Westvaco sets up campaign to tell employees, neighbors and community about its role in Charleston, W. Va.

36 Chemical companies say they'd hike capital outlays in next two years, given rapid tax write-off.

37 Du Pont in Wilmington gets new telephone setup that permits incallers to dial extensions directly.

41 SALES
Carbide's technical service manager shows how to make a department pay off in increased business.

47 CW REPORT
Booming demand for petroleum waxes indicates upcoming shortage of productive capacity.

61 RESEARCH
Merck Sharp & Dohme, Parke, Davis unveil four-in-one vaccines that underscore trend to multivalent products, point up lag in antiviral chemotherapeutic agents.

69 SPECIALTIES
Swimming pools, with 40-fold growth in 10 years, are already a $22 million/year market for specialties—and big growth is ahead.

77 TECHNOLOGY NEWSLETTER

81 PRODUCTION
Pittsburgh Corning's new foamed silica boards bid for process equipment uses. Selling points: they're light as well as heat- and acid-resistant.

84 Wrap-around tape with electrical resistance element solves problems of heating process pipes.

87 MARKET NEWSLETTER

91 MARKETS
U.S. sodium chlorate capacity will top 100,000 tons/year by early '59; pulp/paper uses lead, but rocket demand may come up fast.

97 ENGINEERING
National Research teams new chemical and metallurgical processes to make first large-size ingots of high-purity tantalum.

102 Results of Aspeco's pilot-plant shale-oil recovery program indicate shale is "economically feasible" source of crude oil.

106 CHARTING BUSINESS
Lead-pencil manufacture output to rise 2% this year, increase chemical requirements.

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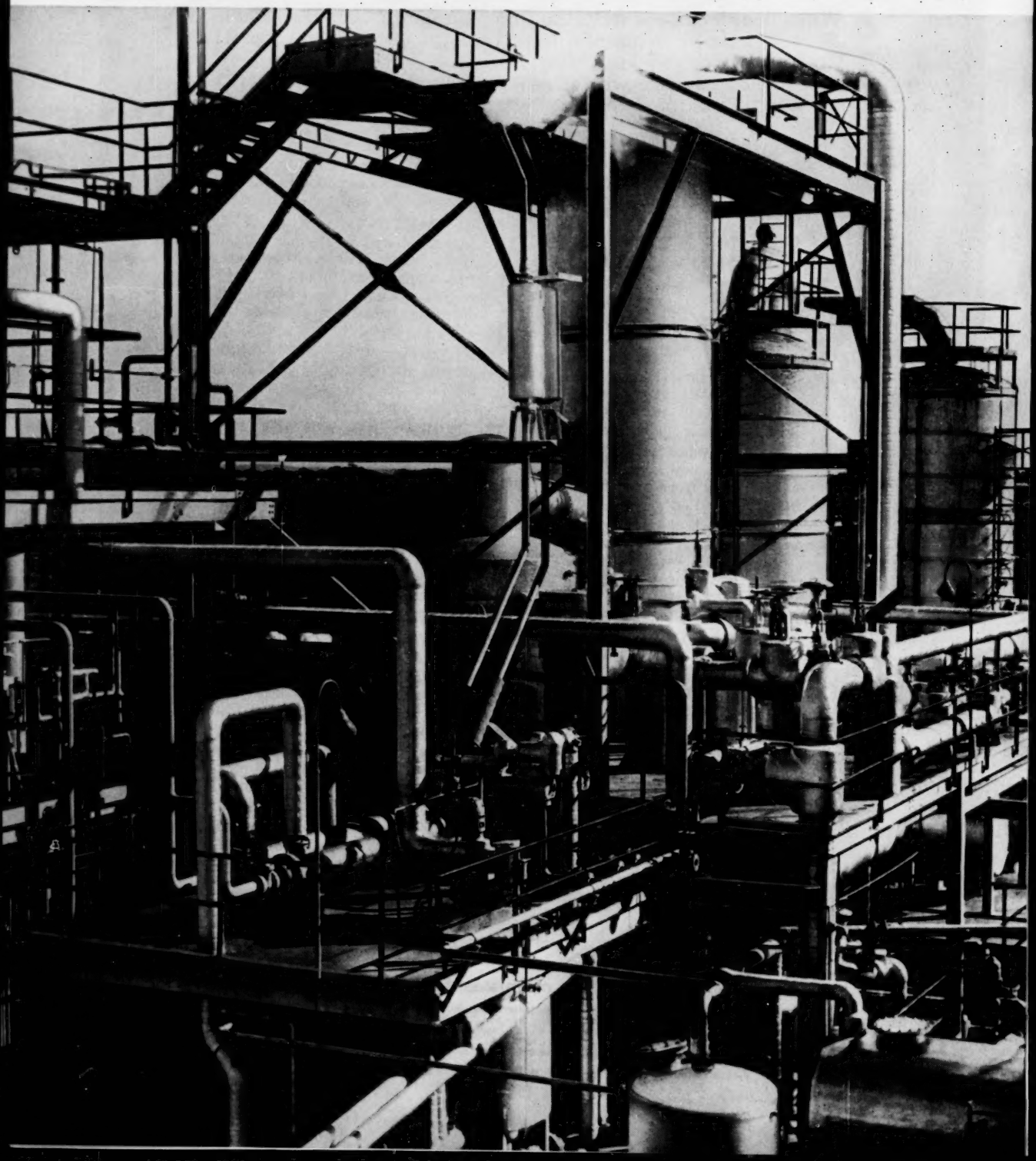
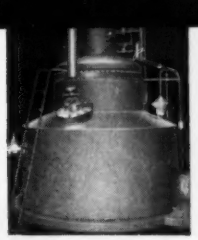
If your new project involves a

Solvent Recovery Unit . . .



process *you* have developed...



Fatty acid esterification . . .

it's a job for Vulcan-Cincinnati

Each of the plants shown here started with a process developed by the customer. And in each case Vulcan-Cincinnati successfully engineered the process into a profitable, full-scale commercial plant.

The variety of processes employed in these plants indicates the wide range of engineering and construction skills which Vulcan-Cincinnati can put to work for you.

When your needs call for minimized plant investment, maximum product quality and low cost per ton of capacity, rely on the experience that has proved itself in hundreds of successful installations.

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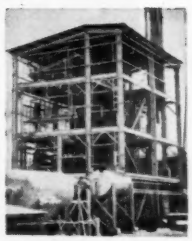

Wood rosin extraction and purification . . .

Trichlorethylene distillation . . .

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HERE'S a basic chemical that might be of use in your development or prossesing work. Methanol is one of the most versatile and reactive of all alcohols—can be oxidized to formaldehyde, decomposed to provide a source of hydrogen and carbon monoxide, or used as a solvent. Whatever the application, you can rely on Du Pont Methanol to meet your most exacting specifications—it's a product with over 3 decades of successful industrial use.

To keep pace with the growing demand for this basic chemical, Du Pont Polychemicals Department works closely with a group of suppliers strategically located throughout the country. These Du Pont Chemical Agents are aware of your local transportation problems, have the equipment, the manpower to assure deliveries timed to meet your schedules.

Your local Du Pont Agent can guarantee highest purity and uniformity in the quantities you need—drums, tank trucks or tank cars. And Du Pont Technical Representatives are always available for assistance through any agent listed below.

FORMULA:

CH_3OH

TYPICAL ANALYSIS:

Purity Exceeds	99.9%
Distillation Range*	0.6°C.
Non-volatile Content	0.00008
Acetone Content	0.001
Acidity or Alkalinity	0.0015
Color A.P.H.A.	2
Odor	Free from foreign odor
Permanganate Test	60 mins.

*ASTM Method D-268

(All percentages on weight basis)

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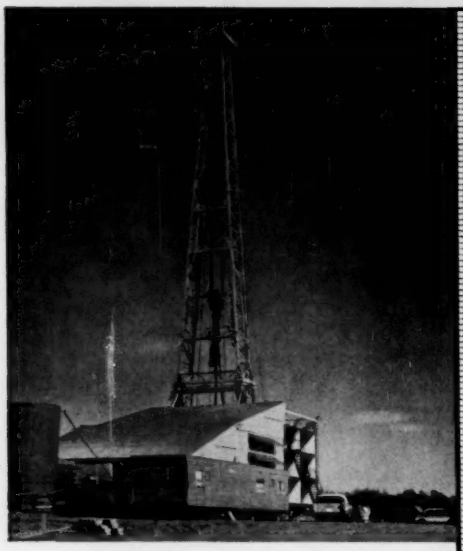
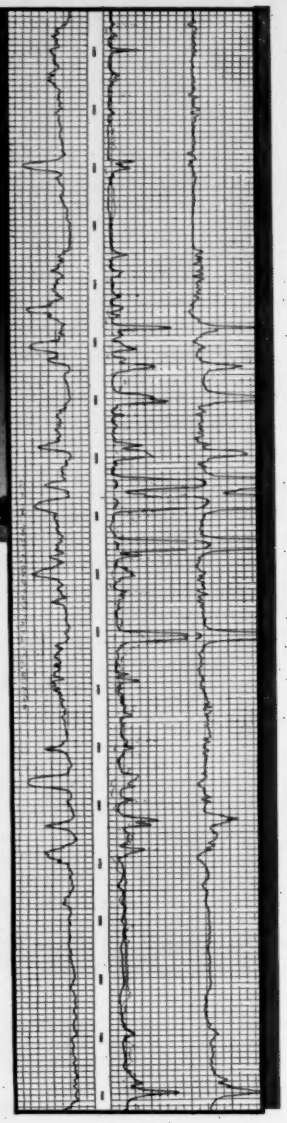


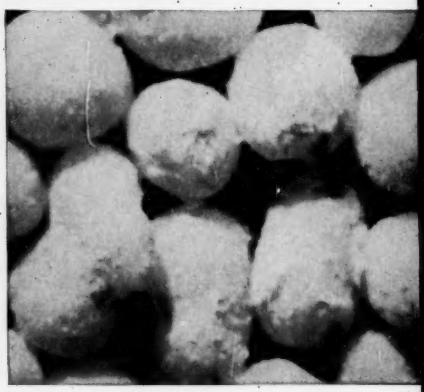


***Salt or Anhydrite Your Drilling Problem?** M & C's Attapulgus drilling clay gives highest yield of any clay in either saturated gyp or brine muds

Electric logging requires good muds—M & C's Attapulgus Clay gives these better muds in fresh water for induction logging and in salt water for gamma ray neutron logging. M & C's Attapulgus drilling clay plus CMC makes the best low fluid loss mud; addition of gyp plus organic thinner gives low gels and low solids muds for highest rate of bit penetration. Attapulgus drilling clay gives a higher yield than bentonite does in either fresh water, gyp or brine. High costs in workover jobs can be prevented by using M & C's drilling clay plus gyp for a stable high-temperature packer mud. Investigate the unique stability of this outstanding drilling clay. This item is *starred*. Use the coupon.

Anti-caking Agents keep sticky chemicals free-flowing; M & C offers a complete line of chemical conditioners

Illustration shows ammonium nitrate prills, 10X magnification, coated evenly with an M & C Attapulgite conditioner that provides a highly-sorptive moisture barrier. M & C anti-caking agents include several Attapulgite products and also various surface modified aluminum silicate pigments (ASP's). Investigate the M & C line whenever chemicals must be conditioned against packing effects caused by time of storage, pressure, temperature, humidity and the like. M & C anti-caking agents are neutral-colored, uniform, ultra-fine, inert powders. A little bit goes a long way—usually less than 2% by weight is needed—and they are low in cost, too.



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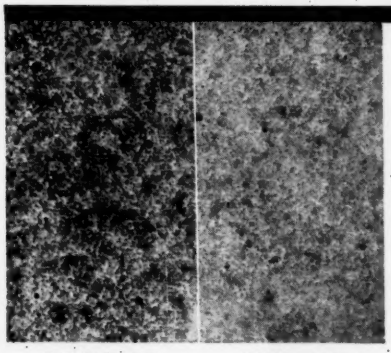
Leaders in creative use of non-metallic minerals

*Reinforced Plastic underbody of sports car exhibits high impact and flexural strengths with ASP filler

Molded Fiber Glass Body Company, Ashtabula, Ohio specializes in molding large, complex reinforced plastic parts. Photo shows preparation of the preform for a car underbody—a part subject to rugged road shock. Use of ASP fillers gives top reverse impact and 180° flexural modulus values. Molded Fiber Glass Body also reports easier mold release, longer pot life, ideal thixotropy. This is a *starred* item. Use the coupon.



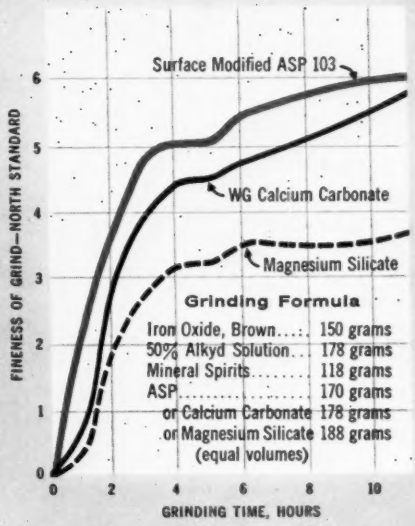
CONTROL ASP 400

Asphalt Laminated Kraft Paper benefits through penetration control with ASP Additive

Photograph shows marked decrease in molten asphalt penetration in 30-30-30 kraft sheets when M & C's ASP 400 was added to the asphalt system. Without addition of ASP, asphalt can strike completely through the paper—which is undesirable. Laboratory studies indicate that penetration control with ASP's helps solve problems connected with bleeding of the asphalt. Could these additives benefit your formulation? Use the coupon for complete test details.

Paint Chemists: new Surface Modified ASP extender pigments reduce grinding time, lower costs

Graph illustrates superiority of M & C's new Surface Modified ASP 103 in gaining desired fineness of grind in quickest time (test details on request). In organic protective systems the new Surface Modified ASP's not only cut grinding time, but also provide superior suspension properties, improved water resistance and adhesion of the film to metallic surfaces. Bulletin T. I. 1026 presents all the data. Use the coupon for your copy and for test samples.



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✓ what you need to get tests started . . .
we'll fill your requests immediately.

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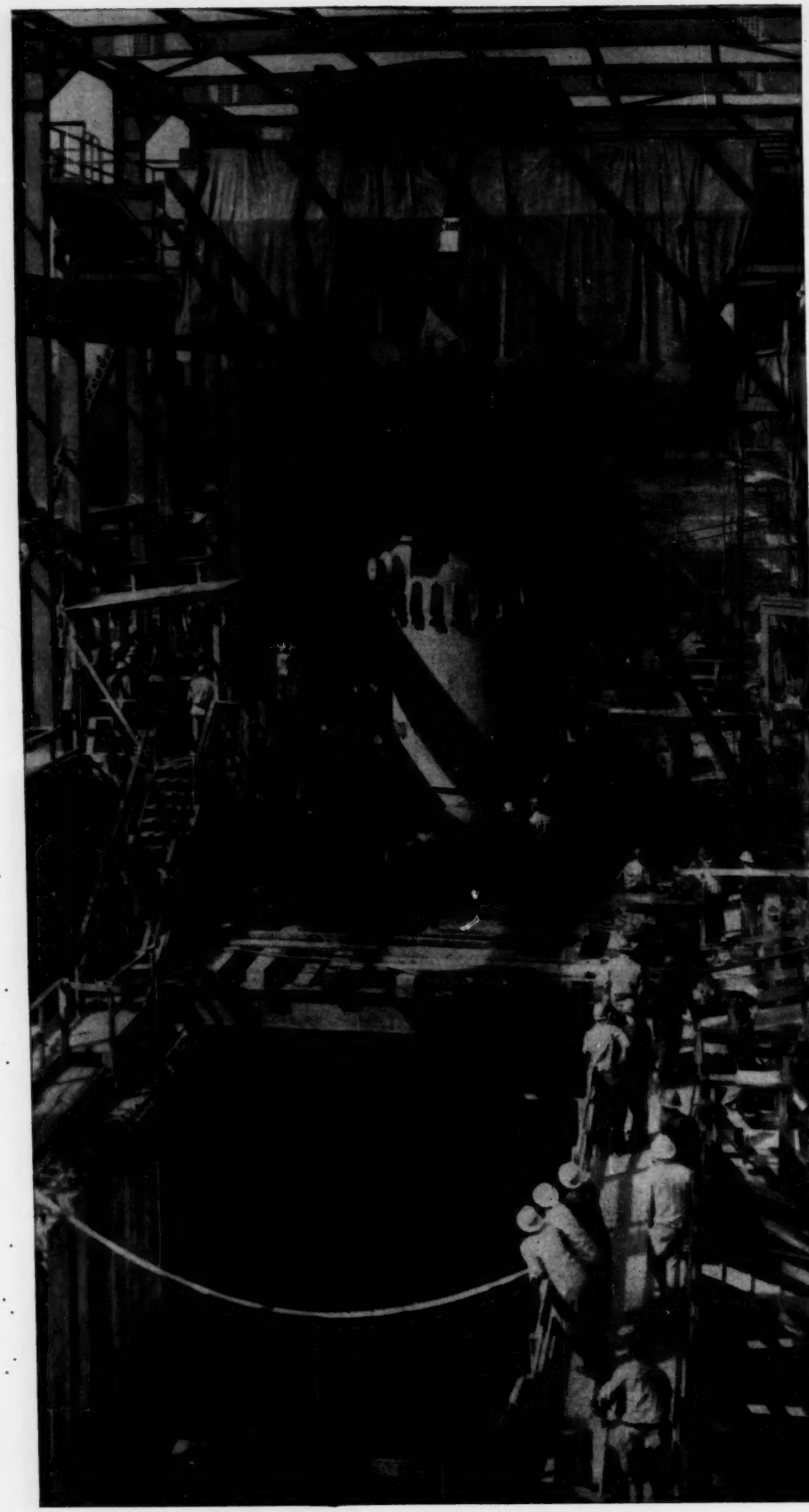


Let DRAVO

Installing reactor vessel for commercial atomic power plant. In addition, Dravo's responsibilities as general contractor included installation of all mechanical and electrical equipment and more than 10 miles of piping.

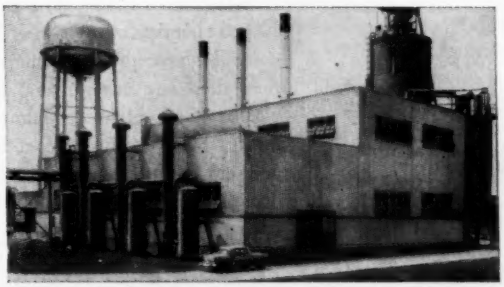
be your construction department

Construction for the process industries demands a specific combination of skills seldom found within one engineering group. Dravo's wealth of experience in construction-engineering of "turn-key" plants, as well as furnishing and installing machinery and equipment of all types, has provided this exact combination.

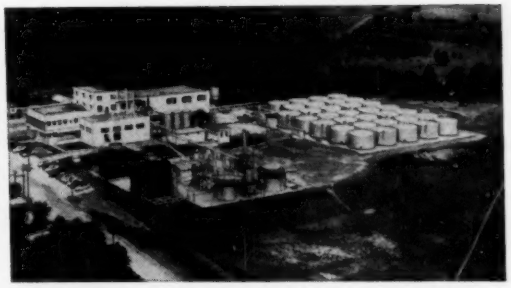
Working to design requirements specified by the customer, Dravo handles construction-engineering, procurement of equipment and erection of the complete plant. With this type of single responsibility contract, the customer is relieved of all details and is assured of the kind of performance that only experienced personnel can produce.

Your next plant project may benefit from the type of teamwork Dravo experience makes possible. One of our engineers will be glad to explain how Dravo facilities can serve you.

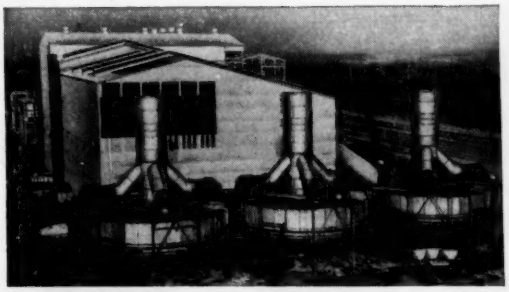
DRAVO
CORPORATION



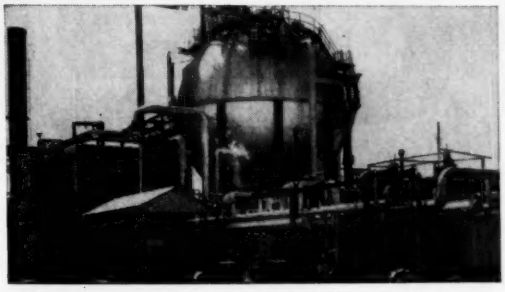
Steam and compressed air for a large automobile parts factory are supplied by this Dravo-designed and constructed boiler plant, one of five such "turn-key" projects for the same company.



Dravo handled installation of all piping and equipment, including tank farm, for this chemical processing plant.



One of the nation's largest sintering plants. Dravo performed all phases of this project on a single contract basis.



This Dravo job involved construction of a complete water treatment plant for an oil refinery, including installation of sedimentation tank and piping.

WE HAVE PIONEERED IN FOAM CONTROL . . .

and today Nopco defoamers are used by countless manufacturers

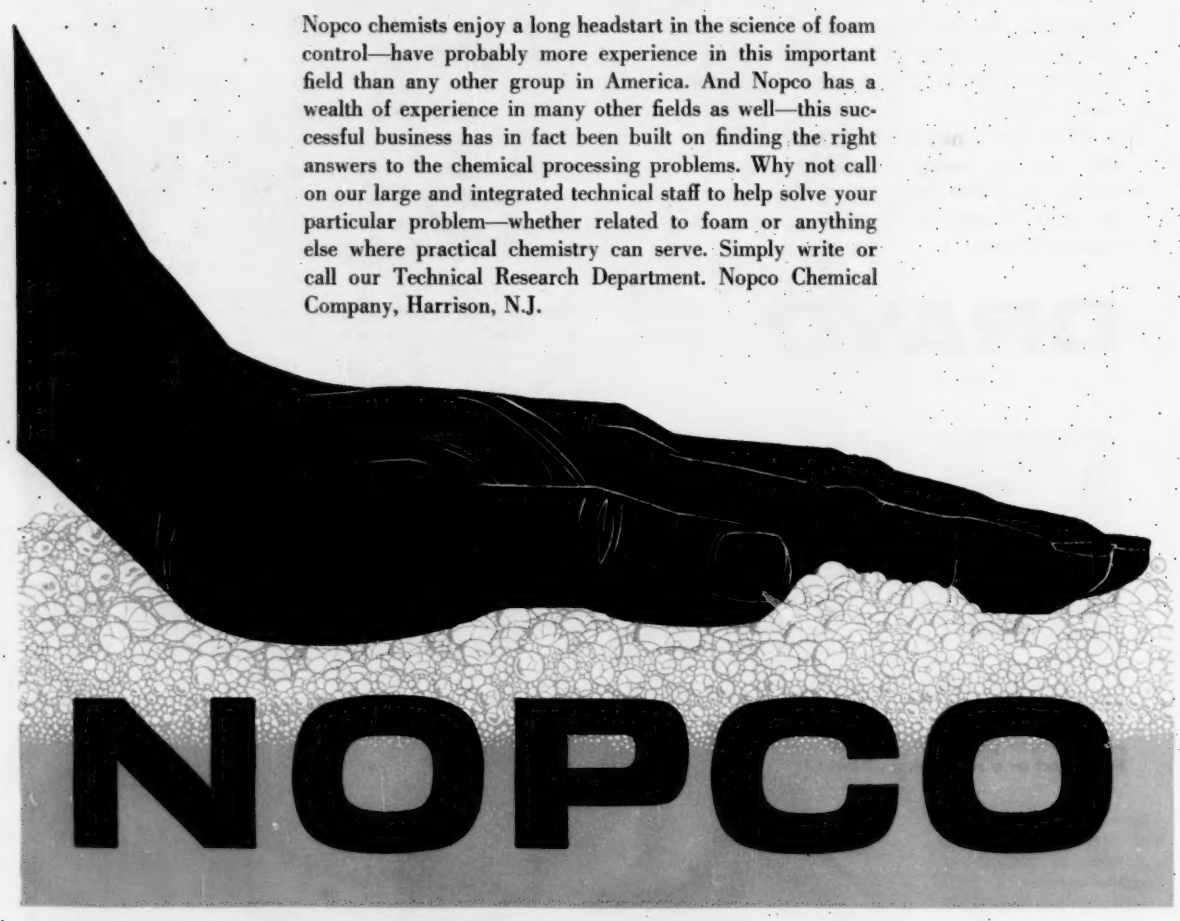
. . . IN PAINT *to prevent the trapping of air, to insure uniformly filled cans and smooth, bubblefree application*

. . . IN PAPER *to help insure uniform sheet formation, higher machine speeds, fewer wet breaks*

. . . IN ADHESIVES *to make possible the mechanized application of glue in large amounts*

. . . IN ANY PRODUCT *where foam would otherwise be a problem*

Nopco chemists enjoy a long headstart in the science of foam control—have probably more experience in this important field than any other group in America. And Nopco has a wealth of experience in many other fields as well—this successful business has in fact been built on finding the right answers to the chemical processing problems. Why not call on our large and integrated technical staff to help solve your particular problem—whether related to foam or anything else where practical chemistry can serve. Simply write or call our Technical Research Department. Nopco Chemical Company, Harrison, N.J.



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VIEWPOINT

WE'RE BAFFLED by the Antitrust Division of the Department of Justice. Latest case in point: the curious suit the Division has filed (*see p. 25*) against Monsanto and Lever because Lever acquired sole rights to sell the "all" detergent manufactured by Monsanto.

The circumstances do not satisfy any of the usual criteria for an antitrust action:

- There was no exchange of producing facilities.
- No product was taken off the market.
- No source of supply was eliminated.

The Government bases its case on the contentions that competition between the two firms is eliminated; that competition in production and sale of detergents may be lessened; that additional detergent mergers may be encouraged; and that smaller competitors will be at a disadvantage. The antitrusters conveniently ignore the fact that Lever is in rough-and-tumble competition with P&G, Colgate and a great many other smaller sellers.

This suit, like many others, manifests an apparent naïveté on the part of the antitrusters about our economic system. Trained almost exclusively in the law (Antitrust Chief Victor Hansen's biography, for example, reveals no business experience), the antitrusters seem to operate on the basis of sterile theory rather than of practical economics. Their proposed method of divesting Du Pont of its General Motors stock, to take another example, shows a distressing lack of awareness of its far-reaching economic consequences.

In their eagerness—apparently to prove to labor that the Administration isn't "soft" on business—the antitrusters have ridden off in all directions. Perhaps with the guidance of advisors versed in the practice, rather than the theory, of business, they could exercise their zeal on acts that are more clearly against the public interest.

H C E Johnson

Editor-in-Chief

OPINION

Decimal-Point Blues

TO THE EDITOR: Our face is red! That nightmare of all market researchers—the misplaced decimal point—has reared its ugly head.

In your article "Polyethylene Grows in Triple Time" (*June 21, p. 93*) based on our Monsanto study, the market for PE overwrap was overstated as follows: terry towels—19.5 million lbs. (should be 1.95); sheets—9.6 million (should be 0.96); wash cloths—4.6 million (should be 0.46); pillowcases—4.4 million (should be 0.44); and dish towels—3 million (should be 0.30). New total, including unchanged items—9.1 million lbs.

It should be noted that this was based on selected items only and by no means represents the ultimate potential for polyethylene in soft goods packaging—lingerie, men's and boys' wear, sweaters, diapers, hosiery and many more make the original 46-million-lbs. figure a real possibility.

(By the way, in the same story *CW* reported that 56 million lbs. of fresh produce are sold in this country annually. The figure should be 56 billion, which in this case is what our study showed.)

With undampened enthusiasm for the future of polyethylene, but with apologies for our error to you and your readers.

MARGARET L. REID
Market Research Manager
Market Development Dept.
Monsanto Chemical Co.
Springfield, Mass.

Not Co-op, Says St. Paul

TO THE EDITOR: . . . The statement (*May 17, p. 83*) that St. Paul Ammonia Products, Inc., is a cooperative is entirely false and the article is grossly misleading in developing the idea that this company is a cooperative. As reference to public records . . . will readily establish, this company is a Minnesota corporation organized and existing under the Minnesota Business Corporation Act. . . .

R. O. SULLIVAN
Secretary
St. Paul Ammonia Products, Inc.
South St. Paul, Minn.

We concede that St. Paul Ammonia Products, Inc., is set up as a corporation. But Central Farmers Fertilizer Co. owns 26% of the stock. Questions to St. Paul Ammonia on the balance of stock ownership and on distribution of its products to cooperatives elicited the reply, "You are not entitled to the information you request . . ."—ED.

Organometallic Safety

TO THE EDITOR: You state (*Technology Newsletter, March 22, p. 61*), "Unfortunately, as Wells pointed out, these promising fuels also have some serious drawbacks. TEA and TEB are extremely destructive to living tissue, react violently or even explode on contact with water or hydrogen containing compounds."

. . . Whereas TEA reacts violently with water, it has been shown that TEB does not react with oxygen-free water at ordinary temperatures. Field tests to date indicate that TEB will burn on the surface of water and fires may be hosed down without danger from explosions. . . .

R. A. WELLS
Gulf Research & Development Co.
Pittsburgh

CW based its report on an abstract of Reader Wells's paper supplied by American Society of Mechanical Engineers. The quotation above was taken directly from the abstract.—ED.

MEETINGS

Gordon Research Conferences, series of 36 topics, Colby Junior College, New Hampton School and Kimball Union Academy, all in New Hampshire, ends Aug. 29.

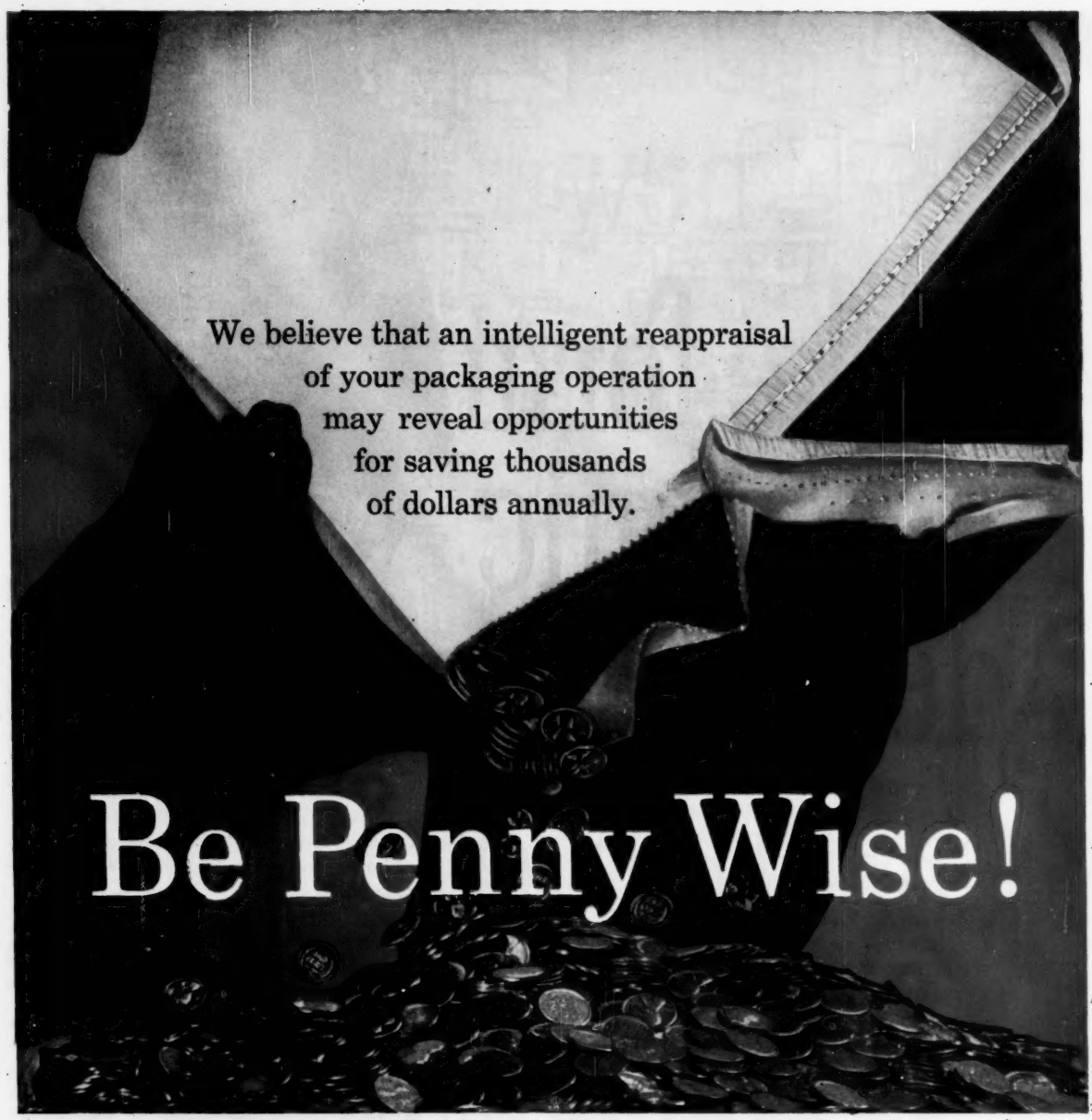
Western Packaging and Materials Handling Exposition, Civic Auditorium, San Francisco, Aug. 11-13.

American Institute of Chemical Engineers and **American Society of Mechanical Engineers,** heat transfer conference, Northwestern University, Evanston, Ill., Aug. 18-21.

American Soybean Assn. and **National Soybean Processors Assn.,** joint annual meeting, Fort Des Moines Hotel, Des Moines, Iowa, Aug. 18-20.

American Chemical Society, national meeting, Chicago, Sept. 7-12.

Institute of Textile Science, sixth scientific session, Physical Sciences Centre, McGill University, Montreal, Canada, Sept. 8.



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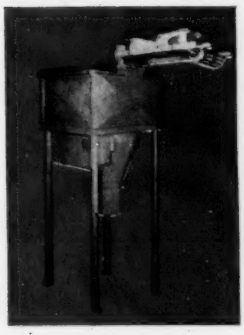

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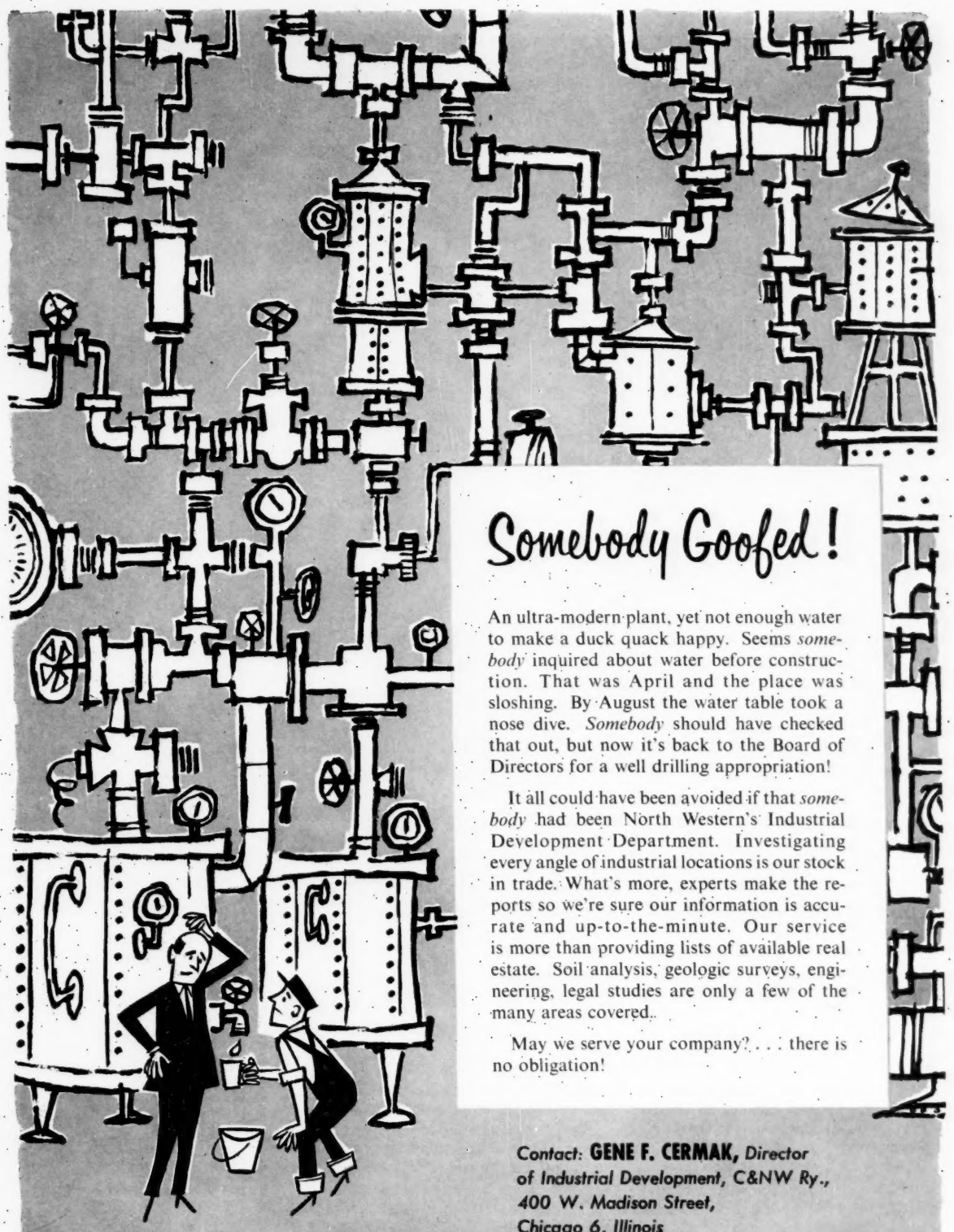

Somebody Goofed!

An ultra-modern plant, yet not enough water to make a duck quack happy. Seems *somebody* inquired about water before construction. That was April and the place was sloshing. By August the water table took a nose dive. *Somebody* should have checked that out, but now it's back to the Board of Directors for a well drilling appropriation!

It all could have been avoided if that *somebody* had been North Western's Industrial Development Department. Investigating every angle of industrial locations is our stock in trade. What's more, experts make the reports so we're sure our information is accurate and up-to-the-minute. Our service is more than providing lists of available real estate. Soil analysis, geologic surveys, engineering, legal studies are only a few of the many areas covered.

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SHELL

Business Newsletter

CHEMICAL WEEK
July 19, 1958

There'll soon be a new source of caprolactam. Two nylon producers—Spencer Chemical and Industrial Rayon Corp.—have formed the Ohio River Chemical Co. to produce caprolactam (starting material for nylon-6 polymer) at a $10-million, 20-million-lbs./year plant to go up near Ashland, Ky. Construction—under license from Dutch States Mines—will start this fall, and the plant is slated to go onstream early in '60. Spencer will take charge of engineering construction and operation.

Spencer will sell part of the new plant's output, thus competing with Allied—until now the only U.S. supplier of nylon monomer. The rest will go to Spencer's molding resins plant at Henderson, Ky., and to Industrial Rayon's Covington, Va., plant for textile fiber production.

Industrial Rayon, incidentally, has just announced commercial production of a new cellulosic tire cord at its Painesville, O., plant. The company says it has no plans for making nylon tire cord.

•

An $80-million pipeline to carry Alberta gas by-products to the Canadian Pacific Coast has been proposed by Foothills Products Pipe Line Ltd., an "all-Canadian"-owned company. Discussions are now going on with Shell Oil Co. of Canada, which has large holdings in the Okotoks gas field. The line, says Foothills, would make liquid by-products from Alberta's gas wells competitive on the West Coast, add $300-500 million to western Canada's economy and probably result in new petrochemical industries.

•

Witco Chemical Co. (New York) is "going public" to help pay for its current expansion program. The company—previously incorporated in Illinois—last week reorganized in Delaware and later this month will offer 150,000 new shares of $5-par common stock. Now outstanding: 608,922 shares. In a consolidated offering, 50,000 shares will be sold for certain principal stockholders.

Witco's assets, according to the preliminary prospectus, total $16.8 million. Sales last year were $39.9 million; earnings, $1.4 million. In '56, sales were $27.9 million; earnings, $982,028. Sales for the four months ending April 30 were $11.8 million, compared with $13.1 million for the same period last year.

Witco also produced a sales breakdown: synthetic detergents and detergent chemicals, 22%; organic chemicals, 15%; asphalt and asphaltic compounds, 14%; emulsifiers and polyesters, 9%; carbon black, 34%; chemicals from other producers, 6%. Carbon black sales, Witco says, equalled about 12% of total domestic production. The company is building a 20-million-lbs./year phthalic anhydride plant in Chicago, due onstream during the second quarter of '59. Its own operations consume 1.5 million lbs. Witco now operates eight plants in the U.S., and one in

Canada, and owns 62% of an unconsolidated English subsidiary with sales of about $3 million.

•

Look for action within the chemical labor unions between now and October, when International Chemical Workers Union (AFL-CIO) will hold its 15th annual convention at Washington, D.C. By then, it may become clear whether ICWU and Oil, Chemical & Atomic Workers (AFL-CIO) will go ahead with their long-proposed merger—and if so, how soon.

It appeared this week that ICWU leaders are more eager for merger than are their OCAW counterparts. To OCAW President Jack Knight's cautiously worded invitation for another "exploratory" parley (*CW, July 12, p. 46*), ICWU President Walter Mitchell has promptly responded with a request that the meeting be held Aug. 11-15 in Cleveland. And while Knight had said that the meeting might indicate how many and how large are the differences between the two unions, Mitchell declares that "we should be able to discuss the content of a proposed constitution for a new union."

Aside from politicking connected with ICWU's election of officers this October, there will be debate over the exact roles of the unions' company-wide bargaining councils. Locals will be heard from.

The locals' autonomy has been evident in recent negotiations. For example, last week ICWU Local 12 at Monsanto's Krummrich Plant (Monsanto, Ill.) ended its two-month strike by accepting a one-year contract. The contract, according to the company, recognizes that responsibility for work assignments is retained in full by management. But just a few days earlier, while the 1,500 Krummrich workers were still out, two other ICWU locals signed up for two-year pacts at Monsanto's Queeny, Mo., and Carondelet, Mo., plants.

Similarly, ICWU locals at various American Cyanamid plants have been renewing contracts peacefully despite the continuing strike of ICWU Local 17 at the Cyanamid explosives plant in Grafton, Ill. The new agreement ending the Krummrich plant strike calls for a 10¢/hour wage increase, one additional holiday, premium pay for Sunday work and other fringe benefits.

•

Industrial "bigness" apparently irks the Federal Trade Commission less than it does the Justice Dept., which is now attacking Lever Bros. for its household detergent operations (*p. 26*).

An FTC examiner has just recommended dismissing the 1956 complaint against Scott Paper Co., which had upped its share of the sanitary paper market from 30% to 38% by acquiring three other companies between 1951 and '54. Last month, FTC sent its case against Brillo (*CW Business Newsletter, June 14*) back to a hearing examiner, ruling that "bigness *per se*" doesn't in itself violate the Clayton Act.

BRIEFS

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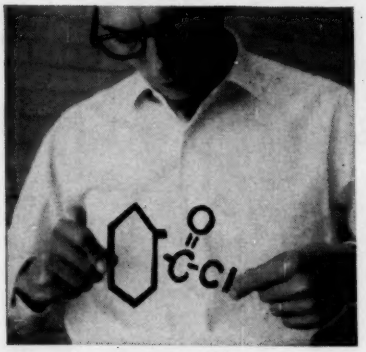

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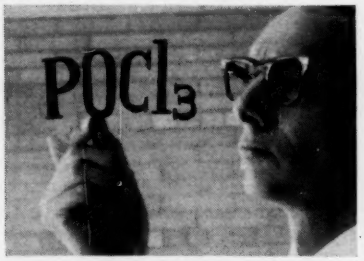

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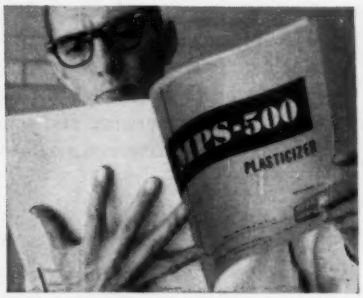

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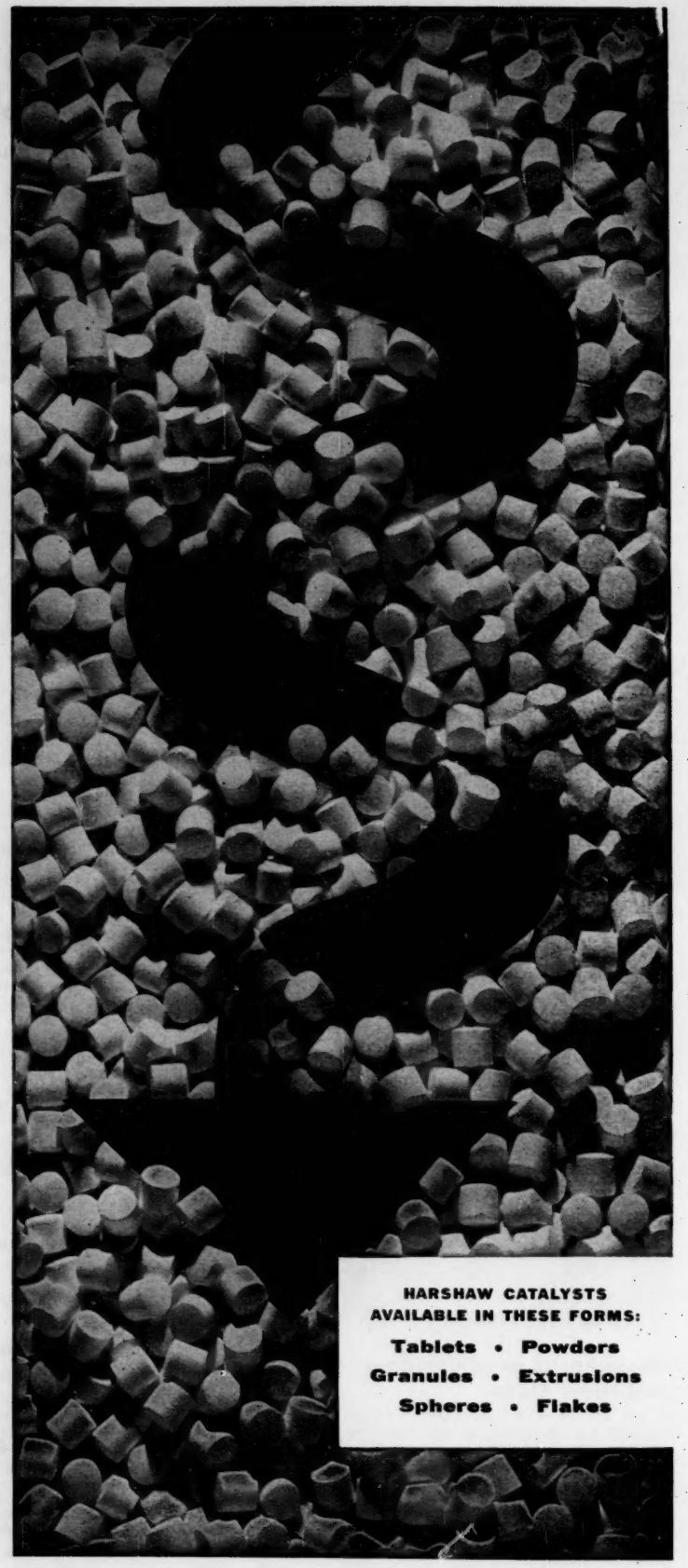

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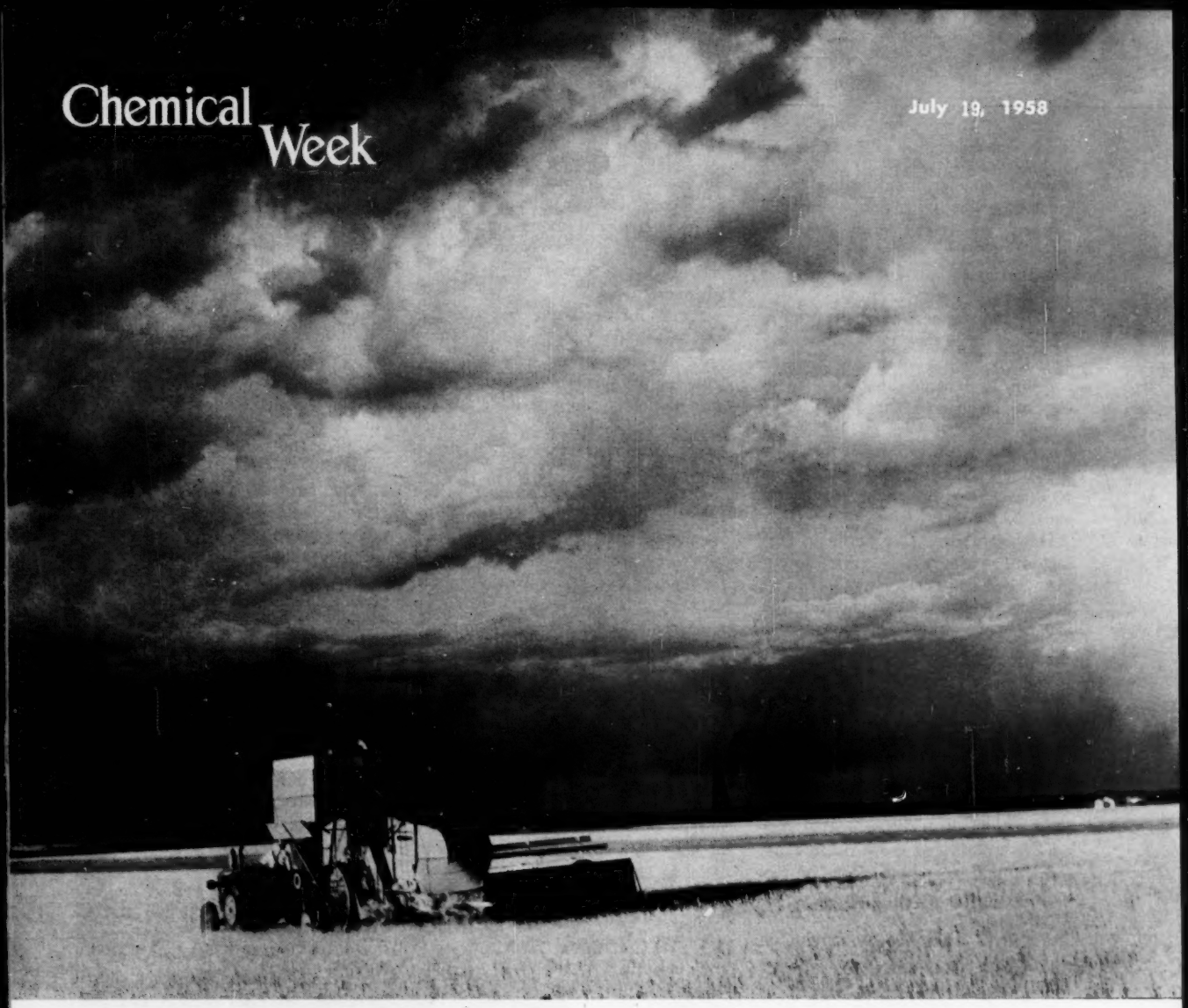
Chemical Week

July 19, 1958



Bumper winter wheat crops being harvested this week are helping fatten fertilizer, pesticide sales.

Farm Chemical Sales Bloom Again in '58

For farmers and for agricultural chemical makers alike, the bumper crops ripening in fields across the country this week mean that a good year has developed out of the cold wet spring. Though final figures aren't yet in, a nationwide survey of producers, mixers, and wholesale and retail distributors indicates that a late burst of sales has largely offset the spring slump.

Total fertilizer sales for the fiscal year that ended June 30 will probably reach—and possibly surpass—the previous year's level.

For pesticides, the picture is more spotty. Sales for the early months of this year were hit by the bad crop weather. But reports from California and Texas dealers, and from various producers throughout the nation, indicate that volume will level out for some products, and reach new highs for others.

Biggest Gain in Wheat Belt: For fertilizers, healthiest sales were in the Midwest and Southwest. Midwestern winter wheat farmers are now bringing to market their biggest crop in years. One large producer reports about 5% sales gains in that area.

In Texas, regional pacesetter, fertilizer sales were especially strong — up about 8%, according to one large producer.

Probably the gloomiest sales reports come from the mid-South and Southeast, usually the heaviest fertilizer consumption areas. Drenching rains during January and February delayed planting and fertilizer buying. The soil bank program took some 6.7 million acres of cotton out of cultivation, along with 110,789 acres of tobacco. Cotton farmers probably made up for some of their lost acreage by using more fertilizer on the crops that remained. But, trade authorities say, every acre of tobacco held out of cultivation is a dead loss. Tobacco, like vegetables, is a "high-yield" crop, and farmers already use about all the fertilizer they can.

Eastern Slump: Elsewhere, low

vegetable prices indirectly may drag down some fertilizer dealers' sales totals for the past year. Vegetable farmers, one New Jersey producer and distributor told *CW*, generally use maximum quantities—sometimes too much.

One-crop farmers especially tend to use more than they need, since they face more of a gamble. But this season they have made slightly less lavish use of fertilizers. The New Jersey company reports sales off 5-8%. But another New Jersey distributor, and a major producer serving the whole Northeast, say that sales just about equal last year's.

Housing Drives Out Farmers: One factor that may weigh down Eastern farm chemical sales is the spread of housing developments out from the urban areas onto farm land. Some dealers already report that sales have dropped along with farm acreage. But to some extent, sales for suburban gardens and factory landscaping help make up for the farm loss.

In California, the housing boom has given the fertilizer market a big lift. While nonfarm use accounts for 10% of the national fertilizer market, the sales to homes and nurseries in California make up about 25% of the state's fertilizer sales. And farm use is holding up as growers use more fertilizer to increase productivity to offset loss of land to the housing boom.

Despite heavy rains in March (usually the peak fertilizer sales season in California), the general consensus of producers and distributors is that the past and coming year will be the best for some time; sales for the past season may have jumped 5%.

More Acreage in Northwest: In the Pacific Northwest, sales are also "quite fine"—due, in part, to increased acreage formed to take advantage of bad weather in the South.

From Utah come divergent reports. Potash prices have sunk as much as $1.60 per ton—even lower than 1925 levels. One major distributor contracted to sell 89,000 tons, could sell only about 72% of it. But Western Phosphates, Inc., called the season "the best year in our history," with business up 20% over the depressed 1956-57 season. And Wasatch Chemical Co. reports sales of mixed fertilizer feeds up 5-10%.

For the coming year, consensus is that the season will be a good one. Moisture conditions are the best in years. Farm income is already 8% over last year, and bumper crops should put more money into farmers' pockets. "All signs point to encouraging prospects," Spencer Chemical states.

Future for Fertilizers: But sales figures alone do not trace the whole present condition or long-term outlook for the fertilizer industry. Sales may be holding up, one trade authority told *CW*, but many producers have taken tremendous profit drops during the last several years.

Overcapacity and declining prices are the big villains. Consumption hasn't kept pace with production, and won't, according to most estimates, for another few years. Total fertilizer capacity this year is reported to be more than 30 million tons. Consumption last year was only 22.5 million tons, including imports, and looks as though it will fall around that level for the year just closed.

Nitrogen capacity from synthetic ammonia is over 3.9 millions tons. Some 2.4 million tons were estimated to be "available for domestic fertilizer purposes" by the Dept. of Agriculture in May—5% more than there was in '56-'57. This does not include inventory "differences." And trade sources have predicted that only 2.3 million tons will actually be consumed.

Overcapacity in phosphates is even more severe. Capacity this year totals an estimated 4.5 million tons. The USDA estimated this year's domestic supply at 2.2 million tons (which excludes 320,000 exported, includes 62,000 imported). That's a 4.3% drop from the 2.3 million ton supply for '56-'57, when only 2.2 million tons were consumed.

Potash is in the same state. Capacity this year is estimated at 2.65 million tons. Domestic supply (excluding 263,000 tons exported, including 195,000 tons imported) for '57-'58 was estimated at 1.9 million tons. The year before, out of a net domestic supply of two million tons, 1.9 million tons were consumed. While potash capacity rose some 50 percent over the past five years, prices on commercial grades of potassium muriate dropped 25%.

Grounds for Cheer: For all this, fertilizer produces and distributors are optimistic about their future. This is the last year of the present acreage reserve program, and some 17 million acres will go back into cultivation next year, or into the conservation reserves. About 10.5 million acres are now in the conservation reserve and another 2 million will be added next year. But much of the land in this program must be fertilized.

Another trend encouraging the industry is the higher concentrations of plant nutrients being used. Tonnage sales totals have slipped 4.4% since the peak years of '52-'53, but content of plant nutrients actually went up about 12%.

The fertilizer industry, along with the USDA, is aiming a stepped-up educational program at farmers, especially those in the North Central states, who they feel are not using enough fertilizer. The potential farm market, trade representatives say, would take up all the present capacity slack.

Other fields for fertilizers to conquer: commercial forests (485 million acres, plus another million planted each year); and the federal highway system (one million acres).

Pesticides Uneven: Regional and national reports from pesticide makers are hard to fit into any single trend.

Stauffer, for instance, reports pesticide sales for the first half of '58 "substantially better" than the first six months of '57. Looming large in Stauffer's sales were new products.

Hercules reports its Toxaphene will probably set sales records this year, due in part to a likely "weevil year" in the cotton belt.

Herbicide Uses Growing: Monsanto, however, reports a slowdown on insecticide sales due to the delayed cotton planting and Florida crop losses. But herbicides, despite the weather, are selling above average levels, the firm reports. Use of preemergence herbicides is "much larger" this year.

For Shell, insecticide sales look "very good" this year. Educational programs in farm areas, the company says, are beginning to pay off. Aldrin and dieldrin sales look "very good."

DDT, waning for the past few years as the newer chemicals edged into the market, staged a surge in exports this year, due largely to the World Health Organization's global antimalaria campaign. But Michigan Chemical recently shut down its DDT plant for the summer, or longer.

Detergent Deal Condemned

In their latest foray into the chemical process industries, the Justice Dept.'s antitrust lawyers will try to convince the court that Monsanto Chemical either should have stayed in the detergent business as a public service or else should have sold marketing rights on its "all" detergents to a distributor smaller than Lever Brothers.

This new civil antitrust suit—filed last week in Federal District Court in New York—brings a governmental contention that Lever's purchase of the trademark and franchise to market "all" and "Dishwasher all" *(CW Business Newsletter, June 1, '57)* was illegal on these counts:

- Actual and potential competition between Lever and Monsanto is eliminated.
- Competition in production and sale of household detergents generally may be substantially lessened.
- Addition of low-sudsing "all" to Lever's already-extensive line of detergents may give Lever a decisive advantage over smaller competitors who cannot offer a full line of household detergents.
- Allowing the Lever-Monsanto deal to go unchallenged might encourage mergers and acquisitions by other soap and detergent manufacturers, thus increasing concentration in the industry.

Real Fight Promised: Lever and Monsanto both say they will vigorously contest this suit, and express confidence that their year-ago transaction will be upheld in court. Monsanto further suggests that the suit might be based on "incorrect information" and "confusing the field of low-sudsing synthetic detergents with the general field of detergents."

For Monsanto, the cost of defending its role in the transaction comes as still another unpleasant association with consumer products. When Monsanto developed "all" back in 1947, in response to Westinghouse Electric's plea for a controlled-suds detergent, Monsanto set up two small subsidiaries in Columbus, Ohio, to handle packaging and merchandising. But with the advent of other consumer-oriented products, the company decided to go into consumer-goods marketing on its own hook.

By the end of 1956, Monsanto told stockholders that its Consumer Products Division—"although diligent"—had not been able to develop enough unique products of major promise. "We face the reality," management stated, "that our consumer products line is not now broad enough to support a completely competitive merchandising organization." A few months later, the company worked out the Lever deal and then disbanded the Consumer Products Division.

"Market" at Issue: In charging that the transfer violated the Clayton Act's ban on anticompetitive mergers or acquisitions, antitrust chief Victor Hansen makes it clear that even though no product was taken off the market, one seller did drop out. And, as Hansen sees it, "price competition among a substantial number of manufacturers is essential" in the field of household detergents.

Monsanto's criticism of the data used by the government indicates that there will be a conflict on a vital question in merger cases: What is the market in which the effects of the transaction must be measured?

The government wants to nullify the Lever-Monsanto contract, divest Lever of "all" trademarks and other rights, and then have some other concern take over the distribution tasks. Government attorneys think this could be done rather smoothly; but company lawyers may come up with evidence that finding a satisfactory merchandiser for these products would be so difficult as to force Monsanto back into the consumer-goods business that it definitely wants to avoid.

Big Play on Stock

Last week, Reichhold Chemicals' common stock surged to an all-time high of $51.50/share—well over double its selling price at the start of the year.

Reasons for the mad scramble for this stock—listed on the New York Stock Exchange only one month—are multiple and mixed.

For one thing, Reichhold sales and profits have been holding up relatively well this year, counter to the industry trend. Second-quarter results are expected to be better than those of the first quarter, and the company has not stinted on dividends.

Even higher sales volume seems likely for the remainder of the year, with a new formaldehyde plant on-stream this month at Hampton, S.C., and increased production coming from expanded plants at Elizabeth, N.J.; Tuscaloosa, Ala.; and Detroit. In addition, Reichhold has come up with three new products that bear promise for quick returns: a synthetic resin for cheaper, faster wood finishing; epoxy resins in liquid and solid forms; and—revealed just last week—a reinforced phenolic resin for missile and rocket parts.

Looking at these facts, two prominent investment houses — Eastman Dillon, Union Securities & Co. and Paine, Webber, Jackson & Curtis, both of which had been among the 65 underwriters of Reichhold's $5.1 million stock offering last March—prepared and distributed favorable reports on Reichhold stock.

Those analyses apparently brought numerous "buy" orders from the public. Most actively traded security on the Big Board the day it hit $51.50/share, Reichhold reappeared among the 10 most actively traded stocks later in the week. Of course, distribution of the company's shares is such that the limited number available for trading—only about 600,000 shares*—tends to make for a seller's market almost automatically.

On top of all these bullish factors, there have been at least three rumors—none of them substantiated—about possible mergers involving this company. Reichhold officials categorically have denied each of these rumors.

Still another point bearing on the relative certainty of dividend payments on Reichhold common stock: the principal stockholder — Henry Reichhold, founder and president—has waived any cash dividends payable to him from April 1, 1957, to April 1, '61, on 750,000 shares of his present holding. This means that any dividends declared—including whatever dividend action the board of directors takes early this week—will be distributed on only about half of the outstanding shares.

*Out of approximately 1.5 million shares outstanding, President Henry Reichhold—who was in Paris opening a new plant for the company's French subsidiary the day the stock soared—owns nearly 800,000 shares; other officers and employees together hold nearly 100,000.

Reds Make Plastic Gains

More light on Russia's fast-stepping plastics industry was shed this week by U.S. plastics and chemical industry men returning from a month-long tour of Soviet plants and laboratories.

Members of the eight-man delegation from The Society of the Plastics Industry generally agreed with Herman Mark's finding (*CW, July 12, p. 21*) that the U.S.S.R. is putting a great deal of money and manpower into its polymer program and that Premier Nikita Khrushchev's goal for an eightfold increase by '65 stands a good chance of being met.

When the entire "team" is back from Europe, members will prepare a detailed report for U.S. government and industry. But last week, four of the delegates gave *CW* their impressions. Reporting were William Cruse, executive vice-president of the Society; Thomas Kinsella, president, Plastics and Coal Chemicals Division, Allied Chemical Corp.; Vincent Lindgren, technical director, Plastics and Resins Division, American Cyanamid Co.; and Theodore Shevzov, research chemist, U.S. Rubber Co.*

Score of Stopovers: The tour took the group on a 6,500-mile circuit that included stops at more than 15 plastics and chemical plants and a half-dozen research centers. While Mark concentrated on research labs, the SPI group focused its attention on production.

They found modern, large plants producing most of the plastics made there. While the Russians seem to be far behind in polyethylene, polyvinyl chloride and synthetic fibers—the group saw only pilot plants for these materials—they are already producing advanced materials like silicones and fluorocarbons. Also, the Russians showed the team a copolymer that was said to withstand temperatures of 1000 C.

One attainment of the tour: the U.S. delegation received some never-before-published figures on Russian plastics production. Last year's output, as reported by the Soviet Chemical Ministry:

Phenolic and other tar-acid resins, 143.3 million lbs.; epoxy and alkyd resins, 64.4 million lbs.; silicones, 4.8 million lbs.; urea and melamine resins, 118.6 million lbs.; caprolactamnylon, 28.2 million lbs.; fluorocarbon and related materials, 44.1 million lbs.; and thermoplastics, 133.4 million lbs. **Total for 1957: 536.8 million lbs.**

Product quality, the group felt, was uneven. In urea and melamines, Lindgren notes, everything was on a relatively small scale, and the Russians weren't too concerned about contamination and color control. In decorative laminating they were doing an especially poor job, Lindgren says, but the quality and scale of their molding operations was impressive.

Equal in Compression Molding: Kinsella considers the Russians' compression molding of conventional plastics equal to our own, and reports that some of their plants are much larger than ours. But injection molding operations were at about half the rate in U.S. plants.

Operations in the Soviet plants (in which women employees usually predominate) were crimped by a notable lack of materials-handling equipment, by overstaffing, and by inefficiencies, Kinsella says. He saw but one lift truck in all the plants visited.

Personnel quality was generally found to be high. Most of the research and engineering people seemed as competent as those in the U.S., but some of the managers smacked more of political status than of technical ability.

Boost for Research: The group was especially impressed by glimpses of Russia's vast research and development programs. Most agreed, in fact, that one of the chief benefits of the trip was a demonstration of the great importance of "R & D" in national security.

With their manpower, materials and know-how, the Russians will probably be able to meet their ambitious expansion goals, even without U.S. help. On this, the Russian industry leaders expressed no doubts, and the delegates who spoke with *CW* agreed. Kinsella says, however, that the Russians will be very anxious to bargain when their exchange group arrives here this fall.

As to selling plants and know-how to the Soviets, the group is not all of one mind. But some members hold that by helping Russia, the U.S. might gain more peaceful relations, get propaganda value out of the gesture of good will and generosity, and possibly obtain strategic or valuable materials at bargain rates.

Easier Entry to Foams

One of the few remaining bars to smaller companies seeking to enter the polyurethane foam plastics products business came down this week as Mobay Chemical Co. (New York) liberalized its licensing program.

Previously, point No. 1 in Mobay's licensing terms had been a requirement for a $40,000 payment for furnishing technical information (*CW, Sept. 3, '55, p. 28*). Now this requirement is eliminated, thus making it more attractive for makers of foamed plastics products to deal with Mobay. In fact, the dropping of this requirement is being made retroactive, in that licensees who have paid the $40,000 now can arrange to have that payment applied to future royalties.

This move comes in the midst of a rapid rise in use of isocyanates to make flexible foams (*CW Market Newsletter, April 26*); and somewhat more than a year after Du Pont eased its urethane licensing terms by cancelling royalty obligations (*CW Business Newsletter, April 20, '57*). In both cases, a major motive is to boost sales of isocyanates—of which Du Pont, Mobay, and Allied Chemical's National Aniline Division are principal U.S. producers.

In commenting on his company's new licensing terms, Mobay President John Eck noted that emphasis in the urethane industry has been shifting away from developmental technology and toward application and marketing activities. Mobay's aim, Eck said, is to offer an arrangement tailored to the needs of the industry.

Over-all, it's clear that while the producers of the basic chemicals will not abandon their research and development work in isocyanates, the essential process technology is no longer a matter of closely guarded trade secrets. And some of the basic patents in this field—notably Du Pont's Rothrock patent, No. 2,282,827—will expire next year.

*Other team members: C. W. Blount, vice-president, Bakelite Co. Division, Union Carbide Corp., R. E. Burk, associate director of research, Du Pont; James Fitzgerald, manager, Plastics Division, Brunswick-Balke-Collender Co.

EXPANSION

Phosphorus Pentasulfide: Victor Chemical Works (Chicago) says it is starting a project to double phosphorus pentasulfide capacity of its plant at Morrisville, Pa. Target date for completion: "before the end of this year." Phosphorus pentasulfide is also produced by Victor at Nashville, Tenn.

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Drugs and Toiletries: Carter Products, Inc. (New York) has begun construction of a $3.5-million plant on a 150-acre site at Cranbury, N.J. This plant—scheduled for completion by late next summer—will be for manufacturing, warehousing and shipping of all Carter toiletry and proprietary products, as well as those of Wallace Laboratories, Carter's pharmaceutical division.

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Sulfur: U. S. Sulphur Corp. (Houston, Texas) has purchased a Frasch-type sulfur plant from Admiral Sulphur Corp. (New York). The three-year-old unit—now located at Long Point Dome in Fort Bend county—will be moved to U.S. Sulphur's property at High Island, Texas. Replacement cost of the unit was placed at more than $1 million.

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Paper: Howard Smith Paper Mills Ltd. (Montreal) is embarking on a $12.5-million expansion program at Cornwall, Ont. New facilities will include a high-speed paper machine, hardwood handling equipment, boiler, finishing building, welfare building and equipment building. Completion of the project by March 1960 will increase the Cornwall mill's fine-paper capacity by 50%, to more than 100,000 tons/year.

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Magnesia: Michigan Chemical Corp. (St. Louis, Mich.) has decided on Port St. Joe, Fla., as the site for the sea-water magnesia plant that has been on the drawing boards for more than a year (*CW, July 27, '57, p. 23*). This plant—enlarging "many times" the company's present magnesia capacity, which is concentrated at its natural brine plant at St. Louis—will have an initial capacity of 125-150 tons/day and later is to be enlarged to 300 tons/day. Products will be high-purity chemical and refractory grades of magnesium oxide.

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Latex: General Latex and Chemical Corp. (Cambridge, Mass.) is planning to build a plant at Charlotte, N.C. Initial investment will be about $500,000, and the plant is to be in operation by November.

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Explosives: Du Pont of Canada's commercial explosives plant at North Bay, Ont.—which went on-stream just last year—will be expanded, starting this month. Cost of the project: about $500,000.

COMPANIES

Foote Mineral Co. (Philadelphia) has been appointed exclusive sales agent in the U.S. and Canada for metallic nickel and cobalt produced by Sherritt Gordon Mines (Toronto).

o

Sun Chemical Corp. (Long Island City, N.Y.) has acquired Coating Materials Laboratories (Nutley, N.J.), producer of a diversified line of industrial coatings and finishes. The Nutley concern—which last year had more than $1 million in sales—will be operated as a division within Sun's Paints and Finishes Group.

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A. H. Robins Co. (Richmond, Va.) has taken over Whittier Laboratories (Chicago). Robins—a pharmaceutical manufacturer—says Whittier will be operated as a wholly owned subsidiary and that its drug-producing capacity will be expanded soon.

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Fluor Corp. (Los Angeles) and **Foster Wheeler Corp.** (New York) have discontinued their merger discussions (*CW Business Newsletter, July 12*); but President J. S. Fluor of the Los Angeles design and construction firm says negotiations are continuing with "several other" concerns—which he declines to identify.

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Nopco Chemical Co.—formerly headquartered at its plant site at Harrison, N.J.—now has general offices at 60 Park Place, Newark, N.J. Sharing the new offices will be Nopco subsidiary, Metasap Chemical Co. Executive, accounting, advertising and sales departments will be in Newark; other departments will continue to operate at Harrison.

o

National Carbon Co. division of Union Carbide Corp. is expanding its chemical products marketing group by establishing two field sales divisions that will be headquartered in New York and Chicago.

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Lehn & Fink Products Corp. (New York) is setting up a corporate department for new-product development. It will serve the Proprietaries-Toiletries, Dorothy Gray, and Tussy Cosmetics divisions.

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Petro-Tex Chemical Corp. (Houston, Texas) has been assigned controlling interest in Grand Central Rocket Co. (Redlands, Calif.) This stock interest—93.4% of Grand Central's securities—had been acquired several months ago by Tennessee Gas Transmission Co. (Houston), 50% joint owner of Petro-Tex. The other Petro-Tex parent company—Food Machinery and Chemical Corp. (San Jose, Calif.)—has invested additional funds in Petro-Tex, to be used in financing Grand Central's activities in high-energy solid propellents and in rocket motors.

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Washington Newsletter

CHEMICAL WEEK
July 19, 1958

The expected crucial fight over reciprocal trade is getting underway in the Senate. The Administration took a whipping in the Senate Finance Committee, which brought out a bill far more restrictive than the measure the House voted by a big margin. The White House will have to give in on some counts if it is to "save" a bill that the President can sign.

Senate consideration of the legislation will be lengthy. And several major amendments will be offered before passage. Best information indicates the Senate will vote a three-year extension, for example, instead of the five years the House approved. And a bitter fight will be made over mandatory controls on oil and textile imports. But the White House thinks it can whip a Senate Finance Committee provision requiring the President to get Congressional authority before rejecting a Tariff Commission tariff increase under the escape clause.

The last big battle ground will be in conference committee—members from both the House and the Senate who reconcile the differences in the two versions. The conferees are powerful; they are the senior members of the Senate Finance Committee and the House Ways and Means Committee.

The House group, headed by Chairman Wilbur Mills, will negotiate from strength—it can take some overwhelming votes to the conference room to back up the House version. The House turned down the so-called Simpson substitute—backed by higher tariff forces—by 268 to 146. The House also rejected a move to recommit the legislation for rewriting by 234 to 147.

The Senate conferees will be bound to some extent by the way the senators vote on the various provisions. For instance, if the Senate reduces the extension from five to three years by a major margin, say by 20 votes, then Chairman Harry Byrd and his colleagues will have strong ammunition to insist on the time reduction in conference.

Similarly, a close vote on mandatory quotas would not give the Senate conferees too much bargaining power in conference.

You can get a good indication of floor sentiment from how the Senate Finance Committee voted on the two issues. On three-year extension, the vote was 10 to 5—a big margin. On requiring Presidential permission before rejecting an escape clause recommendation of the Tariff Commission (the Kerr amendment), the vote was only 8 to 7. On another issue—mandatory quotas—the textile and oil forces claim they can win if they join together, but the margin almost certainly will be very close.

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The new Minute Man ballistic missile will go out for contract awards about Aug. 1. Three different prime contracts will be awarded for

Washington Newsletter

(Continued)

the solid-fueled rocket engines, and most likely the contracts will go to Astrodyne, Thiokol and Aerojet-General. Ramo-Wooldridge, the systems engineer contractor on other Air Force long-range missiles, will have the same role in the Minute Man project.

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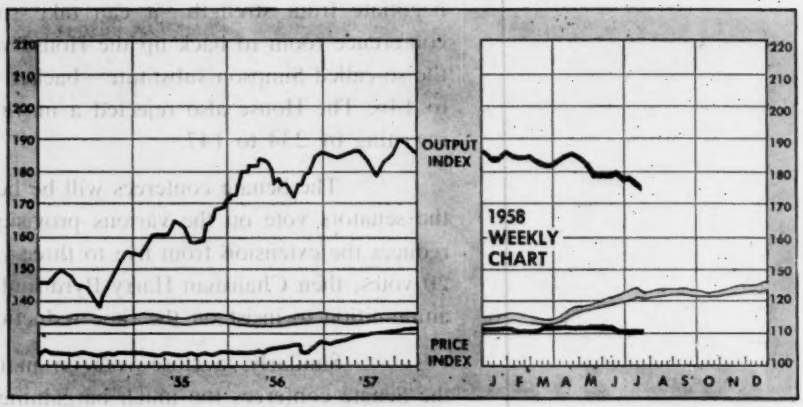
Companies interested in investing overseas should consider seeking participation of the International Finance Corp. That is the affiliate of the World Bank which makes equity investments without government guarantee in private enterprises abroad.

The corporation is beginning to hit stride after two years of organizing. Officials believe investments in chemical industries are particularly suited for IFC's operations. The corporation has invested $1.2 million in Olinkraft S. A. Celulose e Papel, a Brazilian subsidiary of Olin Mathieson Chemical Corp., and $450,000 in D. L. R. Plasticos do Brasil, a locally owned plastic firm. Others will be made soon, probably for a carbon black plant, a nylon plant and a veneer plant, all in Latin America.

IFC's investments now add up to $10.7 million—and this amount has generated an estimated total investment of perhaps $50 million.



Business Indicators

WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-49=100)	168.0	172.0	173.0
Chemical Week wholesale price index (1947=100)	110.6	110.6	110.3
Stock price index of 11 chemical companies (Standard & Poor's Corp.)	40.39	40.66	47.21

MONTHLY Trade (million dollars)	Manufacturers' Sales: Latest Month	Preceding Month	Year Ago	Manufacturers' Inventories: Latest Month	Preceding Month	Year Ago
All Manufacturing	25,116	24,945	28,617	50,955	51,486	53,909
Chemicals and allied products	1,865	1,832	1,996	3,814	3,839	3,729
Petroleum and coal products	1,867	1,947	2,207	3,373	3,441	3,380

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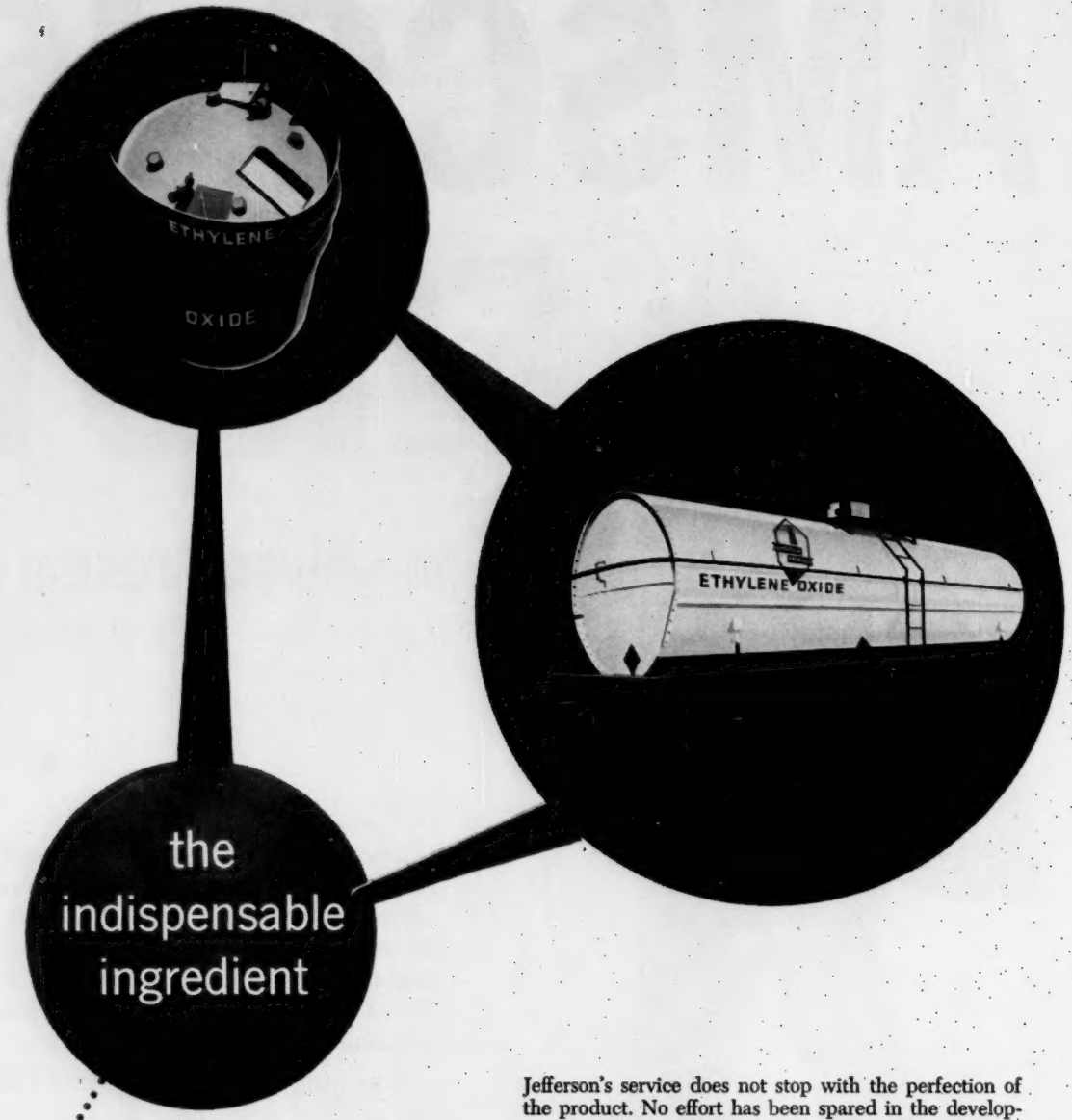

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In public gathering places like the barbershop . . .

and in cloistered halls, Westvaco hopes its . . .

Grass Roots Campaign Tells Local Story

In South Charleston, W. Va., last week, management of Food Machinery and Chemical's Westvaco Chlor-Alkali plant decided to order a fast follow-up on a grass roots community relations program. The follow-up: a second printing and distribution of its "Industry Reports to a Community" booklet telling all that can be told about Westvaco, its people, plants and products.

The report fills a specific need. In late 1956, FMC took a survey of the 36 communities in which it operated plants. Its aim was to find out what people knew and what they thought about the company and Westvaco. In Charleston alone, some 166 questionnaires were mailed out.

The results were an unpleasant surprise to division management. As they put it, "A very large number of people replied that they did not know what Westvaco did and had no definite feeling that the company was an asset to the community. Others showed more knowledge of Westvaco, but still felt that the plant was not an asset for Charleston."

The replies set management to wondering. The Charleston area is a particularly sensitive one for the company anyway, for a number of reasons. For one thing, the plant is not impressive to passers-by.

More important, however, the unit has changed in character and makeup over the past several years. Food Machinery bought it in 1948, upon merging with Westvaco. Even then, the plant had been operating for thirty years or so and there was little question that considerable modernization was necessary to make it fully competitive in the chlorine market.

FMC started improvements. Power generation modernizing was started (and continues); old Vorce cells were replaced with much larger Hooker cells in new cell rooms to double chlorine-caustic capacity. Carbon bisulfide capacity was more than doubled, and production of ammonia was begun. Altogether, considerable millions have been spent in 10 years.

Unsettled Situation: In the process however, unsettling things happened. Employees were transferred, automation was used wherever possible, labor-saving machinery absorbed many traditional push-pull-and-lift jobs. All this meant that at the end, in spite of tremendous increases in capacity, fewer people were working.

A disturbing illusion was created among many employees. Some got the idea that, because of the reduced number of workers, Westvaco was cutting back its operations in South Charleston; others, moved to new and different jobs, became disgruntled; still others felt that "Westvaco won't expand here any more."

Low plant morale, coupled with ignorance and apathy of outsiders, was plainly cause for alarm. As the picture cleared, local management decided to take positive steps to give Westvaco more meaning among its employees and in the community.

Local Effort: To do this, Plant Manager Neil Elphick decided the most effective approach was a booklet about Westvaco, telling as much as possible about the plant, its place in the community, and its relationship to the rest of FMC. It was necessary, moreover, to put the book in the hands of as many individuals and groups as possible in Charleston and, to a lesser extent, the rest of the state.

Elphick asked for, and received, a special budgetary appropriation — the cost of the whole project never exceeded $10,000 — from division

Booklet was originated locally.*

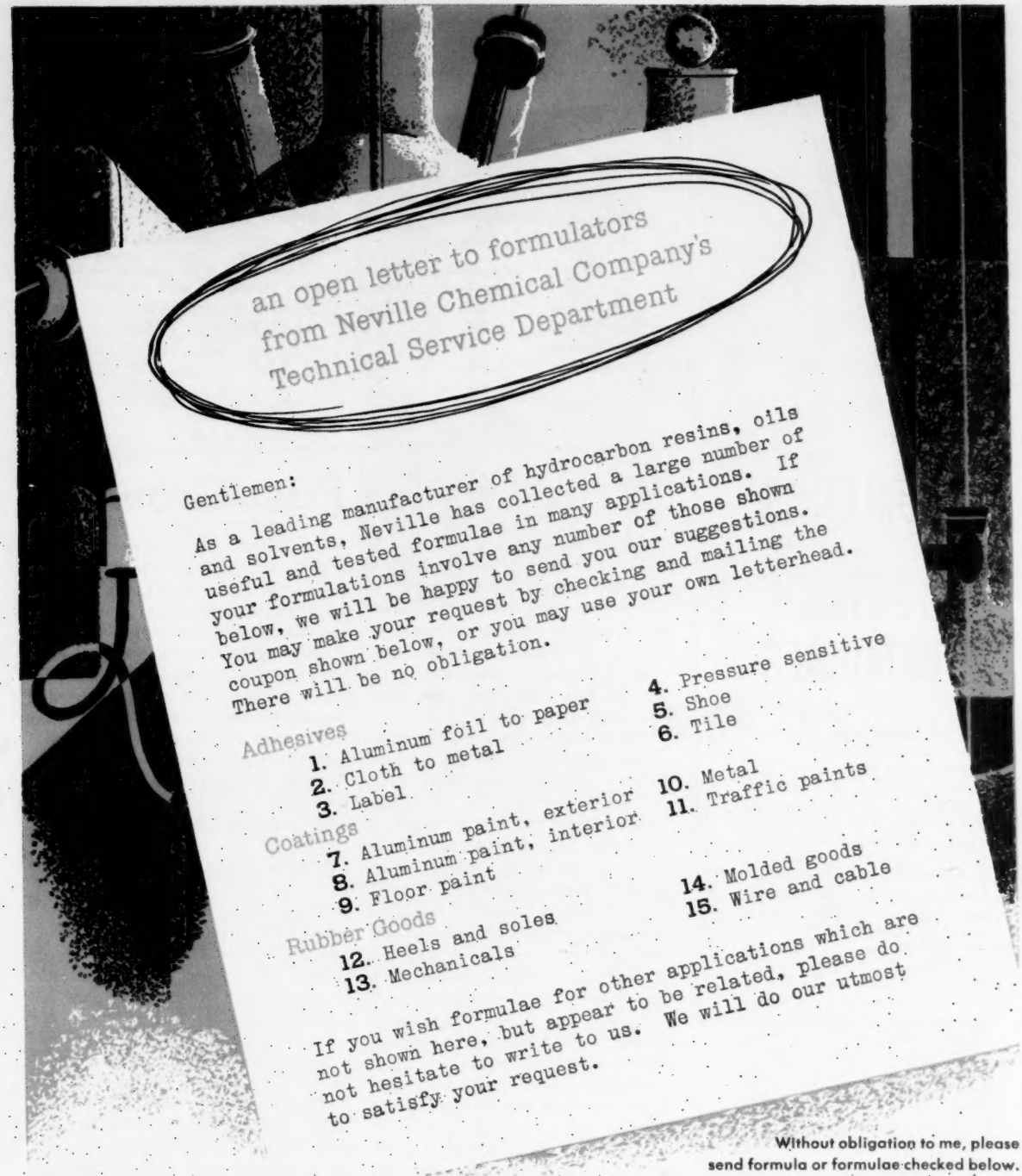
management. Next, he retained a local public relations consultant, Charles Williamson, to map out details for the brochure and its distribution.

The new booklet told of the need for modernization and emphasized that Westvaco had continuing and growing plans for development in South Charleston. In effect, it attempted to answer all the questions, internal and external, brought forth.

Some 10,000 copies were distributed among management of local retail stores and chain outlets, the school principal's office (and thence to the teaching staff), to barber shops, hotels, and other congregating places, to other interested groups. Big aim was to put it into the hands of community leaders and others who, in turn, would further distribute it. Employees and their families received initial copies, too. Soon, more requests came in.

Results: Westvaco feels, of course, that there is no one conclusive measure of the campaign's effectiveness. They point out, however, that an additional printing of 8,000 copies is now needed to answer demand. Numerous groups have asked for copies; the local library has built a special display around the booklet. Even West Virginia Governor Cecil Underwood has written a letter calling it "a most unusual and noteworthy approach for telling. . . about one of our most important industries." Out of all this response, one thing appears certain. In a community where it's exceedingly difficult for one chemical plant to stand out among many others, a lot of people have suddenly noticed Westvaco.

*Initiators include Plant Manager Neil Elphick, Artist Doug Crummet, Public Relations Consultant Charles Williamson.



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NEVILLE

Faster Write-offs Find Favor with Chemical Concerns

(Based on survey by Walter Kidde Constructors on how capital spending would be increased if five-year amortization of plant and equipment were permitted. All dollar figures in millions.)

Companies favoring five-year write-offs

	Companies surveyed	Number favoring	Current-year combined capital budget*	Additional first-year capital spending if five-year write-offs were enacted*
Chemicals	36	25	$966.2	$148.1
Petroleum	15	5	141.7	15.9
Nonferrous metals	14	6	53.5	9.9
Pulp	14	7	30.0	6.2
All others	146	87	573.0	163.7

*Either in '58 or '59.

Write-offs for Fast Growth

The chemical industry, of all U.S. industrial segments, would be most receptive to getting faster tax write-offs than now provided in federal tax law. Chemical firms are being most deterred in current expansion programs by present restrictions on writing off both their plant and their equipment investments.

These findings emerge from a just-completed survey by Walter Kidde Constructors Inc. (New York) —a survey covering 225 companies with combined '58 capital budgets of more than $5 billion. Included were 36 chemical companies whose '58 expansion budgets totaled $1.2 billion—about 86% of anticipated '58 capital spending by makers of chemicals and allied products.

All were asked the following question: Would your company accelerate capital spending in '58-'59 if Congress allowed you to write-off all your plant costs in a five-year period?

Chemicals Are Sole Exception: While almost all branches of industry indicated that new write-offs wouldn't have much effect on spending plans, there was one big exception—the makers of chemicals and allied products (*table, above*).

In this group, 11 of 36 companies reporting said they would boost expansion budgets by an average of 15% if faster write-offs were granted beginning in '58. And 14 of the 36 said they would boost expansion spending about 17% if the write-offs started in '59. Taking in those chemical companies that would not spend more under either condition, the overall effect of new five-year write-offs would be to increase '58-'59 chemical expansion spending by 5.1%. The comparable increase in all-industry capital spending would be 3%.

Speedup in Construction: It should be pointed out, however, that the data doesn't necessarily mean chemical companies would keep up the pace. Since most expansion programs in the industry are planned several years in advance, it might mean only a speed-up, with companies doing more of their scheduled building in '58 and '59, rather than in '60 and '61.

Besides seeking attitudes toward new write-offs, Kidde also asked companies how '59 expansion budgets, under the present law, compare with '58's. Here, chemical companies stayed pretty close to the industry pattern. Nine of the 36 surveyed plan to spend more in '59 than this year; 10 will spend less; 17 will spend the same. Totals for industry in general: more in '59, 46; less, 80; same, 94.

A spot-check of the three largest chemical firms—Du Pont, Union Carbide and Allied Chemical—backs up these findings. Du Pont says it will up '58 capital expenditures about 10% over last year's total of $220 million, will also "modestly increase" research outlays from last year's $80-million level.

Allied says its expansion budget for this year will be governed "to a large degree" by both earnings and amortization.

And Carbide expects to spend the full $150 million it estimated earlier this year.

ADMINISTRATION

Changing Exchanges

People calling individuals at Du Pont offices in Wilmington, Del., last week were able to dial directly to extensions within the company through a new exchange designed specifically for the company.

The new system, called Direct Inward Dialing (DID), involves the establishment of the PRospect 4 exchange, a new Wilmington number created exclusively for Du Pont's headquarters' office calls. To reach an extension in the offices, the caller dials PR 4, followed by the extension number desired. If the caller doesn't know the number he wishes, he merely dials PR 4-1000 to get the regular Du Pont switchboard.

The DID installation embraces more than 6,000 individual extensions. It's the third such industrial installation in the U.S.; American Telephone & Telegraph's main office in New York City has one, the other has been installed for Boeing Aircraft at Seattle, Wash.

Du Pont is contemplating use of DID systems for other offices at a later date.

LEGAL

Monsanto Suit Settled: Monsanto Chemical Co. has settled for $50,000 a two-year, $300,000 liability suit filed against it by a subcontractor's employee in federal district court (Nashville, Tenn.). The sum to be paid to Cecil Ketchum, is one of the largest awarded in recent years in a Tennessee industrial accident involving one individual.

Ketchum had charged that an explosion Nov. 21, '56, at Monsanto's Mt. Pleasant, Tenn., plant hurled him more than 15 feet to the ground from a kiln at which he was working. The fall, he claimed, broke both feet and kept him from work.

Monsanto had charged (*CW, Dec. 21, '57, p. 33*) that Ketchum was not hurled from the furnace by the explosion, but fell instead.

•

Alfalfa Antitrust Suit: National Alfalfa Dehydrating and Milling Co. (Lamar, Colo.) has been named in an antitrust suit filed by the Justice Dept. in federal district court (Denver).

The company—described by the government as the nation's largest producer of artificially cured alfalfa

ADMINISTRATION

—operates 48 plants in eight states. Dehydrated alfalfa is used to add extra nutrition to livestock feed.

The government charges that National's acquisition in the past year of Saunders Mills and Midland Industries lessened competition in the $50-million/year business. The suit claims that National now controls 22% of that market.

The government has asked the court to order National to dispose of its interests in Saunders and Midland and to refrain from acquiring any other competitors. The suit also asked the court to order the company to license its patents on inert gas storage, used in the dehydrating process, to all competitors at a reasonable price.

LABOR

Stoppage Defined: The Arkansas Supreme Court has ruled that Monsanto Chemical Co. at El Dorado, Ark., must pay unemployment benefits to 232 employees for the period, in May and June, 1956, when they were on strike. The Court ruled that because the work stoppage was not due to a labor dispute, the workers are entitled to the money.

The strike lasted from March 2, 1956 until June 8, 1956. Near the end of April, however, Monsanto started up the plant with supervisory employees. The court cited a state law disqualifying employees for benefits if their unemployment is due to a "stoppage of work" existing because of a labor dispute, but ruled that "stoppage of work" now means cessation of business activity at the employer's place of business rather than unemployment on the part of the employee seeking benefits.

•

No Increase: Further evidence of wage "freezing" these days comes from Whiting, Ind., where 400 employees of Union Carbide Chemicals Co. represented by the Oil, Chemical & Atomic Workers Union agreed to extend the deadline of wage-reopening negotiations. The original deadline of July 1, was extended to December 31, 1958.

On written notice, there can be a strike or lockout during the period. But once notice is given, the strike or lockout must be effected within the next ten days. The over-all contract expires July 1, 1959.

KEY CHANGES

William Naden to president, Esso Standard Oil Co. (New York).

Eugene J. Wollschlager to administrative assistant to the president, Robinette Research Laboratories (Ardmore, Pa.).

Wesley S. Coe to director of research and development, Naugatuck Chemical Division (Naugatuck, Conn.), United States Rubber Co.

Henry Arnhold to board chairman and **John Bouwmeester** to president, General Ceramics Corp. (Keasbey, N.J.).

Joseph H. Brant to director of corporate research, Colgate-Palmolive Co. (New York).

Elmer Smith to sales manager, American Plastics Corp., subsidiary of Heyden Newport Chemical Corp. (New York).

John T. Rettaliata to director, S. C. Johnson & Son (Racine, Wis.).

Clark D. Goodman to vice-president, Schlumberger Ltd. (Houston, Tex.) and director of its research laboratories (Ridgefield, Conn.).

W. Kenneth Davis to vice-president, Bechtel Corp. (San Francisco).

Vernon Dawe to president and **Sam Tepper** to executive vice-president, Dawe's Laboratories (Chicago).

Bernard T. Brennan to president and chief executive officer, Anti-Corrosive Metal Products Co. (Castleton-on-Hudson, N.Y.).

E. Roth Janes to vice-president for manufacturing, Chemway Corp. (Wayne, N.J.).

E. B. Brooks to vice-president, Columbian Carbon Co. (New York).

Murray H. Bennett to president, **T. E. Detcher** to vice-president and **E. A. Branche** to treasurer, Chemical Linings (Watertown, N.Y.).

Frank J. French to vice-president, General Chemical Division, Allied Chemical (New York).

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Interpreting the Trend To Technical Service

Arthur B. Steele (*right*), manager of Union Carbide Chemical's technical service department, had news of additional responsibility dropped in his lap a few weeks ago: he's to be in charge of the $4-million, 53-unit technical services center Carbide will build in Mount Pleasant, N.Y.

Last week, Steele told *CW* of the problems of technical service —just how far a firm can go in providing such service and do so profitably. His comments give a clue not only to the reasoning behind the important Carbide decision, but behind the moves of several companies that, in the past few weeks, have made or completed plans to expand their technical service operations:

- Du Pont has dedicated a technical services lab for its Electrochemical department, at Chestnut Run, Del.
- Diamond Alkali has just opened a new lab for helping the pulp and paper industry.
- Thiokol has cut the tape on a polyurethane service center.

Payoff—More Business: Although these units serve different industries, they were all built for one basic reason, according to Steele: The proven success of technical service in "bettering a supplier's business by bettering a customer's business."

Aerosol packaging, latex paints, crease-resistant cotton fabrics and urethane foam resins are but a few examples of new products —hence new markets—opened up largely by technical service, says Steele.

Involved, of course, is the transfer of some phases of application research from the customer's laboratory to that of the supplier. Responsible: the complex technology, the high cost of research and the great influx of new products. "Few customers," contends Steele, "can afford today to evaluate all new products becoming available for their industry."

The net result is that manufacturers, large and small, turn to raw-material suppliers for preliminary information and data, for new ideas and suggestions on how to capitalize on them. Laboratories have more work than they can handle with existing facilities, and a continuing shortage of competent personnel is also likely to tighten the pinch.

This situation, believes Steele, imposes physical and economic limits on technical service. As a general "rule of thumb" he believes that technical service should be limited to areas that complement the functions of customers and should not attempt to replace them.

"Toxicity studies are an example," notes Steele. Determination of product toxicity is a responsibility of the supplier but evaluation of the toxicity of an end-product (made from the supplier's raw materials) is the job of the formulator.

"Customer requests for advice on bulk storage facilities is a similar problem," Steele adds, and "one that's recurring frequently

Carbide's Steele: "Technical service is a help, not a substitute, for customer's work."

now, as the cost differential between bulk and drum shipments is accentuated." Steele feels "obligated and privileged to tell customers . . . the best way to bulk store and handle goods. But responsibility for design, construction or installation of storage tanks is totally the responsibility of the customer."

Chemical companies frequently are asked to provide technical help in areas outside their normal field of interest. Great as the temptation is, the technical service department "should not be everything to everybody." Both customer and supplier will benefit more if technical service is limited to areas where the supplier has a high degree of technical competence. Very often, says Steele, the "far-afield" inquirer can be referred to a company specializing in the area.

The Tab: How much should a company spend for technical service? The amount, suggests Steele, will depend on several factors. "In general, the closer you are to consumer markets, the newer the product line, the more complex the product end-uses are, or the faster the pace of technological change, then the higher the cost of technical service. Producers selling both new and well-established products should expect to spend 1 to 1.5% of sales revenue for sales service; companies close to consumer markets or offering a major portion of their output as new products or process chemicals may expect to invest 5 to 8% of the sales dollar for service."

Allocation of the technical-service dollar will vary considerably among different companies; at Carbide, approximately equal amounts are spent on each of the five basic areas of technical service — assisting customers in the proper use of products; encouraging new uses; following customer requirements to determine specification changes for the product; sales training; determination and evaluation of changing market trends.

It's important, too, he adds, that the amount of technical service offered in any one field really bears some relation to that field's actual or potential consumption of chemicals. Fortunately, Steele avers, "the small account has very limited technical problems that are often easy to answer. Many times, answers to their problems can be found in published literature."

Matter of Ethics: The sheer growth of technical service and the steady development of new applications will increase the suppliers' knowledge of customer operations. "Invariably, users of the same raw materials will to some extent use your products in a similar way . . . and the technology we learn in working with one customer can't be used as industry knowledge and spread to other competitors in the same industry."

To one degree or another, Steele believes the question of customer confidences arises in all technical-service work. And effective customer-service work requires a high level of mutual confidence and cooperation.

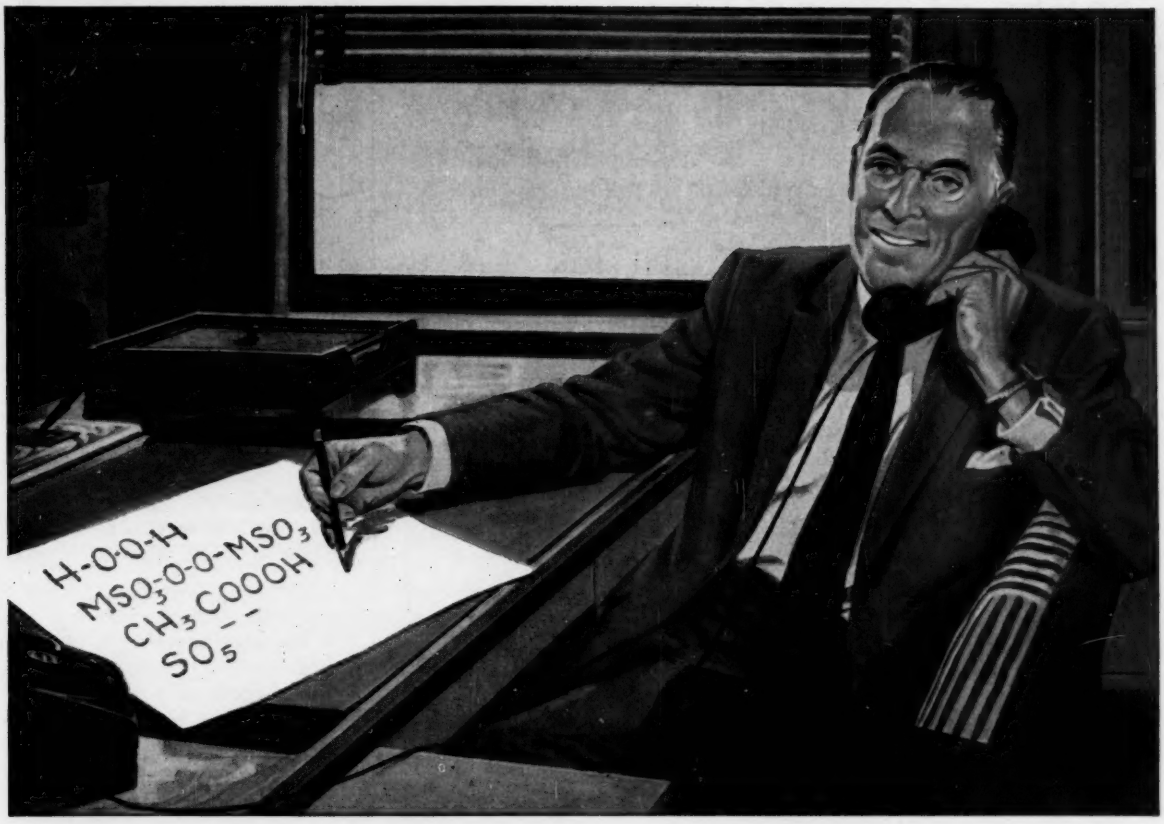
"In most instances," he says, "there's no conflict of interest because customer problems in the same industry often vary and one doesn't need to violate one customer's secret in order to render service to another." Nevertheless, there are instances where "one must limit the amount of service rendered — even to the point of passing up opportunities or opening the door to a competitor."

One answer to the problem: "recommend that the customer use a reputable consulting organization."

If it's apparent that a specific application for a product will have wide usefulness on an industry basis, Steele recommends that a supplier develop the application through his own research. That leaves the supplier free to take the information to the whole industry.

Gentlemen's Agreements: Legal and patent limitations must be recognized in cooperative programs involving technical service personnel of the supplier and technical or operating personnel of the user, notes Steele. And it's especially so "where the cooperation involves novel or secret processes or products. An agreement on immunity or an assignment of rights prior to active cooperation may be as important as the cooperative effort itself."

Salesmen often "overguarantee" a product. They suggest it for applications where its successful use is not assured — and where the supplier cannot be responsible, although such responsibility is implied. Steele emphasizes: "Proper training of salesmen in product and industry areas.



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SALES

Such instruction will minimize the hazard.

Unfortunately, there's no hard and fast rule for avoiding legal problems, according to Steele. "Each case must be weighed in its own terms."

Recession Effect: It is his contention that the current business slide has increased customer demands for cost-saving ideas. The steady growth in the use of technical service is also stemming from general industrial growth. The chemical industry, Steele adds, will meet the challenge, will welcome opportunities to solve customer problems. But in meeting the challenge, many a company will face some deep soul-searching on the question of "How much to whom?"

DATA DIGEST

• **Ethylene Glycols:** A 40-page technical bulletin supplies comprehensive sales specifications, analytical procedures, physical and chemical properties, uses, shipping and handling recommendations, toxicity, and bibliography of ethylene glycol, diethylene glycol, triethylene glycol, and tetraethylene glycol. Jefferson Chemical Co. (Kansas City, Mo.).

• **Methyl Butynol, Methyl Pentynol:** A 60-page bulletin on methyl butynol and methyl pentynol gives detailed information on physical properties, storage and handling, methods of analysis, chemical properties and applications. Chemical application section covers reactions of the chemical's hydroxyl group, of triple bond, of acetylenic hydrogen. Application section, 30-pages long, describes major uses of the chemicals, with particular attention to their uses as solvents for various resins. Air Reduction Chemical Co. (New York).

• **Calcium Cyanamide:** A 60-page booklet provides information on chemical properties of the cyanamide and its many reactions. Source book is designed to stimulate new independent research efforts in expanding the potential use of the chemical. American Cyanamid Co. (New York).

• **Sodium and Potassium Borohydrides:** A 34-page manual covers properties, reactions, handling requirements of these chemicals. Included are detailed data on reactions in aqueous and nonaqueous solvents; also as tables of properties. Metal Hydrides Inc. (Beverly, Mass.).

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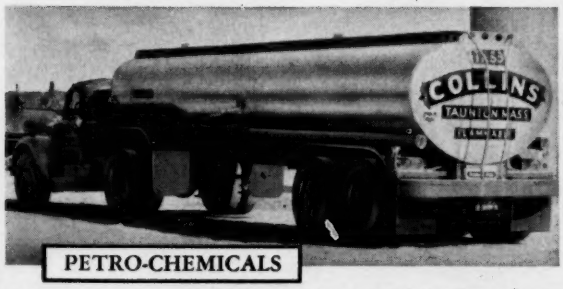
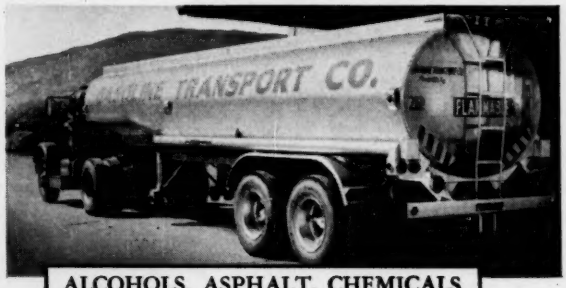


PETRO-CHEMICALS

STAINLESS STEEL FRUEHAUF TANK-TRAILERS are operated by Collins Transportation Co., Inc., Taunton, Mass.

EDIBLES, FLAMMABLES

STAINLESS STEEL FRUEHAUF TANK-TRAILERS are operated by Miller Motor Line of North Carolina, Inc.



ALCOHOLS, ASPHALT, CHEMICALS

STEEL AND ALUMINUM FRUEHAUF TANK-TRAILERS are used by Gasoline Transport Company, Louisville, Ky.

CHEMICALS, HOT COMMODITIES

ALUMINUM FRUEHAUF TANK-TRAILERS are used by Robinson Tranfer Motor Lines, Inc., Kingsport, Tenn.

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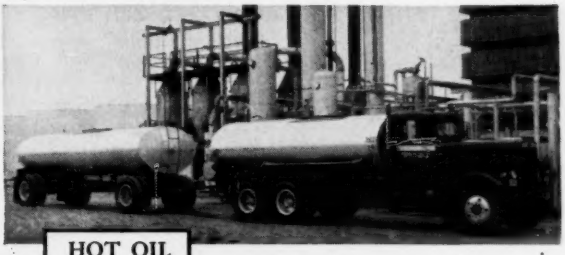

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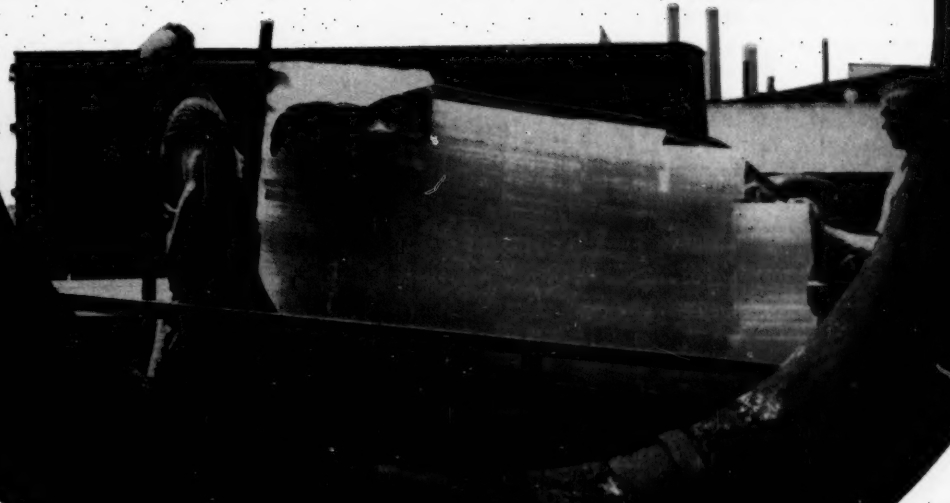
of all waxes
sold last year –
may well be
in short supply
by 1960-65.
Reason:
The packaging industry's
demand . . .

C W Report

. . . for wax is growing so fast that it may outrun the total petroleum wax supply – as long, that is, as refiners continue to produce petrowaxes by convention methods. Hundreds of CPI firms have a stake in the answer to this question . . .

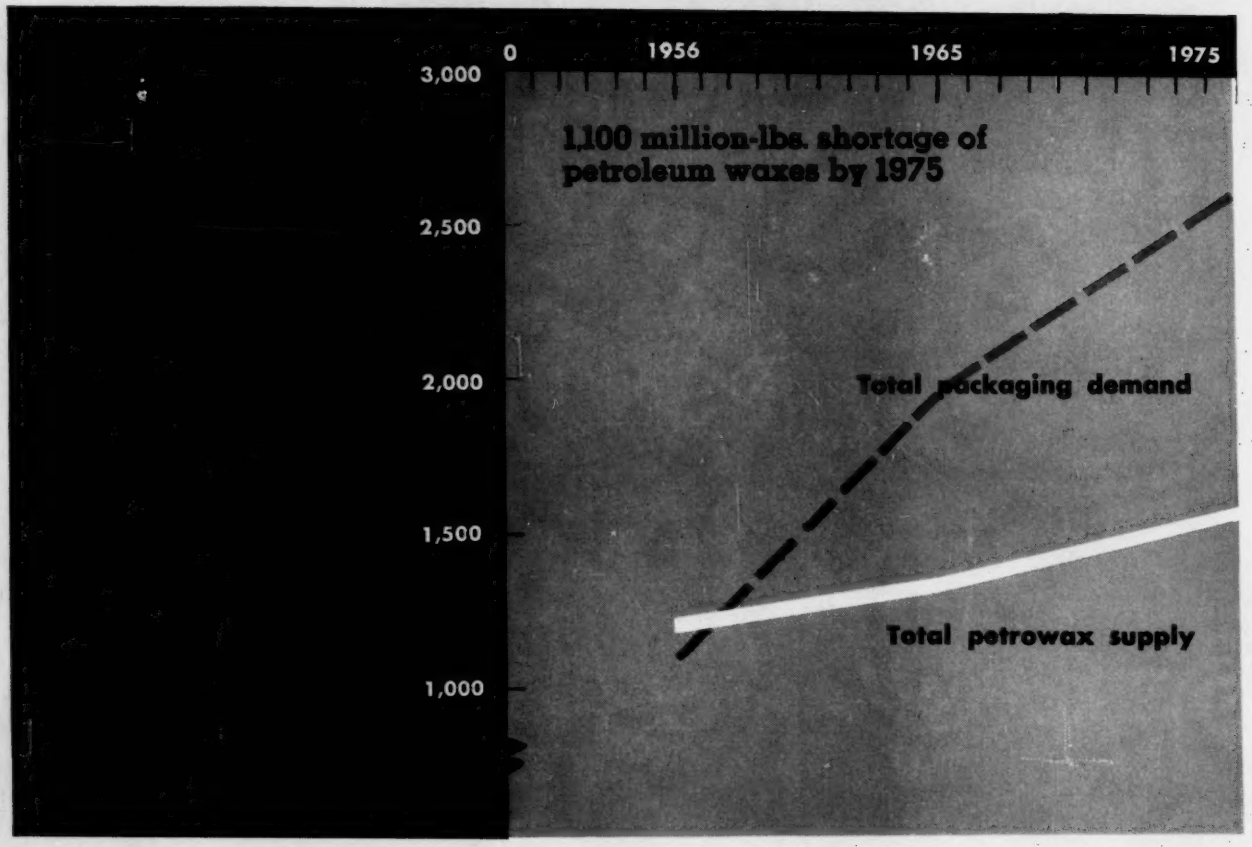
Will Waxes Meet the Production Challenge?

by Maurycy Bloch

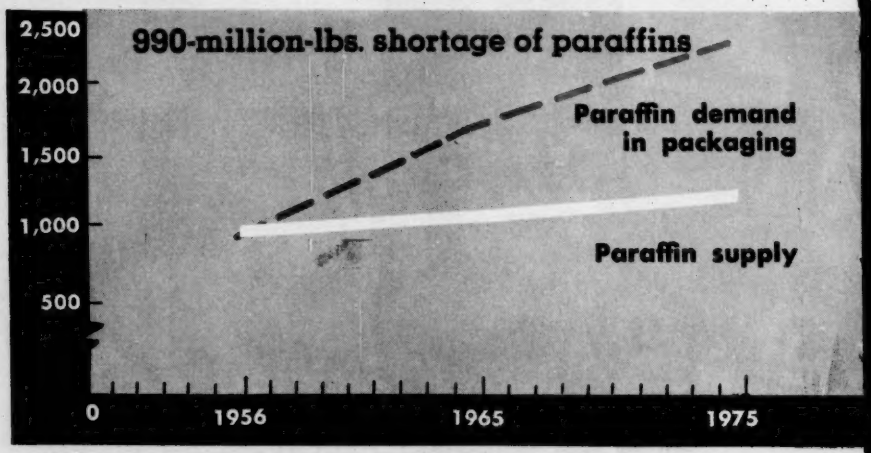


Will Waxes

Unless bold steps are taken, there will be a...



Breaking down the total deficit to a...



Meet the Production Challenge?

In 1957, demand for waxes of all kinds totalled 1.33 billion lbs./year. Petroleum waxes — paraffins and microcrystallines mostly — accounted for 98% of this demand, sold to the tune of 1.30 billion lbs. (of which 60% were paraffins, 17% were laminating-coating grade microcrystallines and 23% were semirefined paraffins and tank-bottom waxes). The breakdown of demand for other wax types follows: vegetable — 14.90 million lbs.; animal — 7.20 million lbs.; mined — 2.75 million lbs.; all others — 2.50 million lbs.

Synthetic waxes — halogenated, hydrogenated, polymerized, Gersthofen and Fischer-Tropsch types, for example — are rapidly building sales tonnage volumes. So are natural waxes, from sugar cane and lignites. Oxidized microcrystalline waxes are cutting a swath in carnauba outlets. And competitive products — like aluminum foil, plastic films, specialty papers and disposable glass — are forceably bidding against waxes, as well as against one another, for acceptance in the packaging market.

All in all, the wax business embraces an intricate interplay of marketing forces: 31 wax producing companies, 22 blenders and formulators of wax products, 22 wax importing and exporting companies (see pp. 56, 57) and scores of suppliers of competitive materials have a stake in the present and prospect of waxes.

Potential shortages overshadow the outlook. By 1965, demand for petroleum waxes in packaging—by far the biggest wax market — will increase 80%. But petroleum-wax supply will increase only 25%, so long as petroleum refiners stick to conventional refining methods. Unless refiners adopt processes that yield more petrowax, shortages will be here sometime before 1965.

The adjoining charts predict what will happen if current trends continue. By 1965, paraffin wax supply will lag behind packaging demand by 611 million lbs.; it will be behind 1 billion lbs. by 1975. Laminating-coating grades of microcrystalline wax will be short some 13 million lbs. by 1965; 38 million behind in 1975.

These dire forecasts stem from the link between petrowax supply and lube oil production. And lube-oil consumption per car-mile is tapering off at an annual rate that nearly balances any anticipated increase in demand from growing numbers of cars on the road. In 1957, 928 million gals. of motor oil were consumed. By 1960, consumption will have climbed only slightly, to 950 million gals. 1965 and 1975 motor oil consumption will hit 973 and 1,030 million gals.

There's also a trend toward low-viscosity oils (SAE 10-30) for automotive use. Yet microwax is derived mainly from the production of heavy oils. There's now nothing in the cards to reverse this trend, and the microwax supply outlook is not hopeful.

Paraffins, on the other hand, could build enough tonnage to meet the packaging demand — if petroleum refiners shift from conventional refining methods to techniques that will hike petrowax output. Refiners have three alternatives — all of them technically feasible, but, for the most part, uneconomical right now.

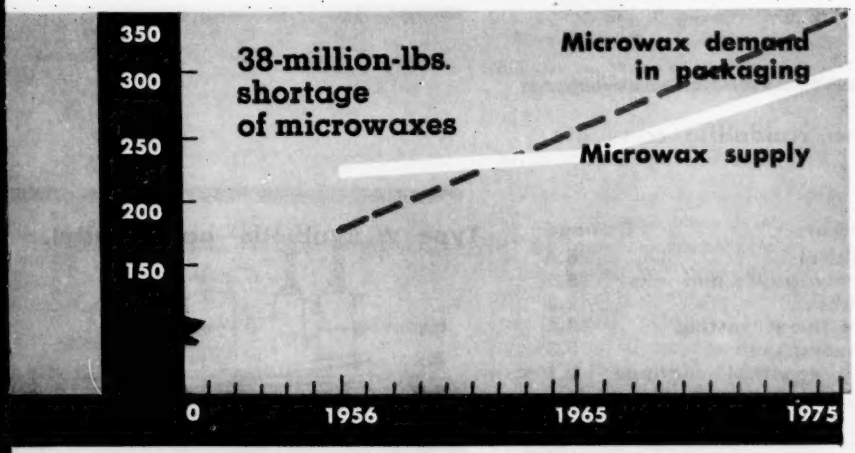
Refiners could: 1) de-wax high wax-bearing crudes, 2) de-wax selected distillation cuts, 3) increase efficiency with which they de-wax conventional cuts. So far, only two companies in the U.S. (Union Oil Co. and Esso Standard Oil) and two abroad (Imperial Oil in Canada and Phillips Petroleum in Venezuela) have moved in the direction of No. 2 or No. 3. Today's paraffin prices offer little inducement for change.

But if a serious shortage materializes, paraffin wax prices will stiffen. There's a good chance that more refiners will then adopt one or more of the possible alternatives to boost paraffin output.

Processing changes will not palliate a shortage of microwaxes. Their output is basically keyed to heavy lube oil production; and microwax is such a small percentage of the crude that process revamping would not be warranted by the potential gain in recoverable tonnage.

Petroleum wax import-export balances might be adjusted to divert more petroleum waxes to domestic use. But this is already occurring as overseas wax markets are gradually being lost to growing foreign capacity.

A shortage, moreover, would create demand for substitutes and wax-packaging alternates, where technically and economically feasible.



PETROWAX PRODUCTION

Petrowaxes are still, for the most part, by-products of the refining of petroleum crudes; petrowax production hinges essentially on the demand for lube oils.

Petrowaxes vary in composition and properties depending on the crude source. Pennsylvania crudes, which yield the finest available grades of lubricating oils, contain relatively high

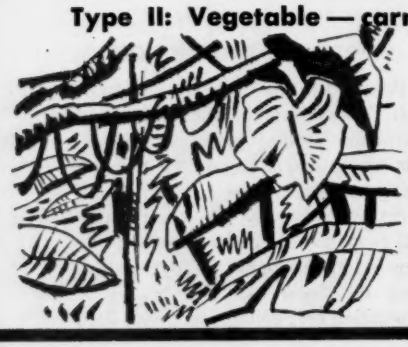
Breaking Down Demand for Five Types of Waxes

In 1957, seventeen major uses ran up a total demand of 1.3 billion lbs. for the five basic wax types—petroleum, vegetable, animal, mined and synthetic. This breakdown shows which waxes went into what markets and the tonnages (in millions of pounds) consumed.

Type I: Petroleum—paraffins, microcrystallines, etc.

Markets	Demand
Paper and packaging	1,090.0
Candles	66.7
Chlorinated paraffins	25.8
Carbon paper and inks	22.5
Explosives	22.5
Polishes	20.6
Electrical	12.4
Rubber	12.0
Textiles and cordage	11.4
Matches	5.4
Chewing gum	3.0
Investment casting	1.3
Paints and varnishes	0.6
Rust preventatives	0.5
Fruit, vegetable coatings	0.5
Leather	0.4
Cosmetics	0.1
Total	1,295.7

Type II: Vegetable — carnauba, candelilla, cane, etc.

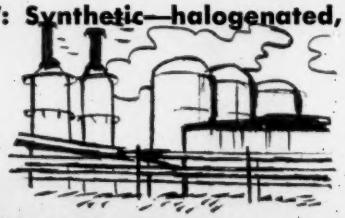


Markets	Demand
Polishes	6.4
Carbon paper and inks	5.5
Leather	2.3
Investment casting	0.5
Chewing gum	0.3
Fruit, vegetable coatings	0.1
Total	15.1

Type III: Animal—beeswax, sper

Type IV: Mined—ozocerite, mont

Type V: Synthetic—halogenated,



maceti, shellac, etc.

Markets	Demand
Cosmetics	4.4
Candles	1.5
Polishes	1.0
Leather	0.3
Total	7.2

an

Markets	Demand
Polishes	2.1
Cosmetics	0.4
Leather	0.3
Total	2.8

hydrogenated, Fischer-Tropsch

Markets	Demand
Polishes	2.5
Total	2.5

percentages of paraffins. Midcontinent crudes (the bulk of today's crude supply) contain varying amounts of both paraffin and microcrystalline waxes; these crudes yield lower quality initial lube oil fractions, which are further refined. West Coast crudes, which give generally poor lubricating oils, contain little or no paraffin and only moderate amounts of microwaxes.

Paraffins: Slack wax, a semirefined paraffin is gleaned by low-temperature solvent extraction of unrefined neutral oil. The de-waxed neutral oil is filtered through activated clay and/or extracted with solvent, to yield a base lubricating oil stock of about 10 SAE viscosity. Slack wax contains 30% residual oil that's removed by further refining. What is left is fully refined paraffin with a 120-150 F melting point. Paraffin wax possesses a platelike crystalline structure.

Microwax: Low-temperature solvent-extraction of bright stock (an unrefined heavy oil fraction) yields petrolatum, which contains microcrystalline wax with some residual oil. After de-waxing, the bright stock is stripped of solvents and further refined by filtration or extraction. Product: a base lubricating oil stock of SAE 60-70 viscosity. Microwaxes are noncrystalline, melt at 145-210 F. A high melting point (185-210 F) microwax, called "tank bottom" wax is derived by de-oiling the settlings in crude oil storage tanks.

The methods described above are the essence of conventional refining as it relates to wax production. As lube oil production grows, these means can be expected to turn out 1.08 billion lbs. of paraffin in 1965, 1,239 million lbs. in 1975. By the same token, microcrystalline supply should reach 245 million lbs./year by 1965, 304 million lbs./year by '75.

PACKAGING CALLS THE TUNE

Waxes find many markets and end-uses, as these tables show here. But the most important single outlet, by far, is paper and packaging. Alone, this big market consumes over 1 billion lbs./year (83% of total wax consumption) of paraffins and microwaxes. By 1975, it will more than double this take.

Currently, a revolution is under way in consumer packaging. Several influences spark the changes now taking place: population increase, a generally expanding economy with greater disposable personal income, growth of self-service selling, and increasing leisure.

A recent industrial survey found that more than 78% of about 200 responding companies planned packaging changes over the next few years: 54% said they would improve their package styling; 38% anticipated changing package types: 40% said they will change packaging materials. Reasons given: increased sales appeal, cost reduction, increased product protection and standardization.

The mounting pressures on petrowax supply stem from demands made by producers of 1) waxed paper, 2) milk and fluid containers, 3) butter and ice cream cartons, 4) cup and nested containers, 5) frozen food packs, 6) laminations, and 7) miscellaneous food board. A summary table of the following data appears on pp. 52, 53.

Waxed paper: In 1956, sulfite and glassine waxed-paper producers recovered from the production slump of the year before (731.9 million lbs. of waxed paper were produced in 1956 vs. 709.9 million lbs. in 1955) and steadily increased output since.

What caused the slump and recovery? Mostly the impact of cellophane on the bread-wrap market, followed by a spirited counterattack by waxed-paper producers.

By 1957, they turned out an estimated 740 million lbs./year of waxed paper, consuming 222 million lbs. of petrowaxes in the process. By 1965, waxed-paper production should require 270 million lbs./year of petrowaxes, and 350 million lbs./year by 1975. About 60% of this demand will be for fully refined paraffins, the rest for laminating-coating grade microwaxes.

Bread wraps at one time accounted for about 50% of waxed-paper output. Today, it claims less of a share—about 30%. Reason: waxed-paper usage is expanding more rapidly in other directions—frozen-food wraps, consumer product wraps and industrial specialty wraps, for example.

Waxed paper should continue to hold its present share of the bread wrap market. What's more, waxed-paper output is growing with rising frozen-food sales.

C W Report

WAXES

Packaging Shapes the Impending Wax Shortage

Here's how petrowax demand by 7 major packaging uses could shape up against supply if output remains tied to conventional refining. All figures are in million pounds.

		Waxed paper	Milk containers, etc.
1956	Paraffins	131.7	384.1
	Microwaxes	87.8	11.9
1965	Paraffins	165.6	785.7
	Microwaxes	110.4	24.3
1975	Paraffins	210.0	970.0
	Microwaxes	140.0	30.0

Right now there's little danger that plastic packaging films, like cellophane and polyethylene, will cut deeper into waxed-paper markets. That's because in most cases plastic films offer users little technical advantages to offset increased costs.

This situation could change, however, if plastic-wrap prices become more competitive with those of waxed paper, or if wax prices rise. Waxed paper and cellophane marketers both face formidable potential adversaries in polyethylene film and other new packaging materials. Crown Zellerbach's newly introduced 1 mil. polyethylene bread wrap "Crown Seal" is one of these.

Milk and fluid containers: Milk and fluid containers make the biggest packaging demand on petrowax supplies. In 1950, 401 million lbs. of milk and fluid container stock were manufactured; 161.2 million lbs. of paraffins were consumed. But by 1957, container-stock production had shot up to more than 1 billion lbs., consuming an estimated 445 million lbs. of paraffins.

Current coating practice calls for use of from 2-4% (sometimes as high as 15%) microcrystalline in the coating to improve over-all characteristics. This new use for microwaxes is one of the most important demand factors challenging normal microwax supply.

Over the past five years, wax requirements in the milk- and fluid-

Butter containers, etc.	Nested containers, etc.	Frozen-food containers	Special food boards	Laminating and other uses	Total demand	Total supply	Balance
198.5	114.5	28.6	51.9	—	898.3	950.0	51.7
5.8	3.5	—	—	72.0	181.0	233.0	52.0
309.9	203.7	127.0	98.7	—	1,690.6	1,080.0	610.6 short
9.6	6.3	—	—	107.0	257.6	245.0	12.6 short
441.3	267.2	199.5	141.1	—	2,229.1	1,239.0	990.1 short
13.7	8.3	—	—	150.0	342.0	304.0	38.0 short

container market have grown more than 45 million lbs./year, a pace that should hold through 1965 when 810 million lbs. of petrowaxes will be required for this end-use alone. A 1-billion-lb./year demand for petrowaxes is coming by 1975.

Half of all the fluid milk sold now goes into waxed containers. And, waxed containers are finding expanding markets as fruit juice packs. Fresh fruit juices have gained such popularity on the Eastern seaboard, for example, that bulk juice is being shipped by freighter or tank truck, packaged in waxed containers close to the market.

Competitively priced disposable glass bottles and synthetic-resin (polyethylene, mainly) coated board are strongly vying for a bigger share of the business. These packaging forms should be regarded as being complementary to waxed containers in a generally expanding market — complementary, at least, for the time being.

The Swedish-designed new tetrahedron-shaped and polyethylene-lined board milk container is getting careful attention from the field.

Butter and ice cream cartons: By 1957, carton stock production for this use had reached 495.5 million lbs./year, requiring 212.4 million lbs./year of paraffin. Wax content amounts to about 30% of the weight of the finished product. Improved coating performance is being obtained by addition of small quantities, about 2-3%, of laminating-coating grade microwaxes.

Looking ahead to 1965, annual paraffin and microwax requirements for this packaging end-use should hit 309.9 million lbs./year and 9.6 million lbs./year, respectively. Annual demand by 1975 will probably be close to 441.3 million lbs. of paraffins and 13.7 million lbs. of microwaxes.

No substitute materials are being offered that might economically compete with petroleum waxes in this particular area of packaging.

Cup and nested containers: Self-service marketing and disposability have fostered the growth of cup and nested containers; 244.5 million lbs./year of round container stock were produced in 1950. By 1957, output had jumped to an estimated 515 million lbs./year — an average increase of 18%/year. By 1965, this type of container will require 203.7 million lbs./year of fully refined paraffins, 6.3 million lbs./year of microwaxes. Demand will reach 267.2 million lbs./year of paraffins and 8.3 million lbs./year of microwaxes by 1975. No competition for waxes is developing in this area.

Frozen-food packs: Booming frozen food sales are giving a big boost to the petrowax industry. A production level of 98.8 million lbs./year of frozen-food container board was scored in 1950. Last year, estimated frozen-food container output was clocked at 280 million lbs./year— an average yearly increase of 26%.

Paraffin wax demand in this market jumped from 14.1 million lbs./year in 1950 to an estimated 39.9 million lbs./year last year. By 1965, paraffin demand will more than triple, reach 127 million pounds. Demand in 1975 will rise to 199.5 million lbs./year.

These forecasts are based on an average use of 12.5% wax in the finished board. Actually, the amount varies from 6-8% on overwrapped board to 15% on printed container stock, a relatively new development in frozen-food packaging.

No formidable competition for waxed frozen-food containers has so far developed. But it's well known that producers of polyethylene coated board and aluminum are anxious to broaden their products' acceptance as frozen-food packaging.

Laminations-coatings: Microwaxes are widely used as a low-cost adhesive for joining papers, plastic films and metal foils to themselves and to each other. Wax also improves flex and retards water-vapor transmission through the laminate. Dehydrated foods and military rations are typical big outlets for laminated packaging. In other fields, thermal insulation producers are big users. Because of the brisk demand for laminating-coating microcrystallines, one petroleum refiner, Sun Oil Co., is shipping tank cars of 75% microwax-25% butyl

Meet the Author

Maurycy Bloch, vice-president and general manager of Warwick Wax Co., subsidiary of Sun Chemical Corp. (New York), is probably the only top management figure in the U.S. wax industry today who can claim a four-generations-old wax heritage. His great grandfather (together with the local town apothecary) set up ozocerite wax mines in Boryslaw, Poland, almost 100 years ago. Until the outbreak of World War II, his family was in the petroleum wax business overseas; his father assisted in discovering the Carpathian oil fields, was owner and president of several oil producing companies in Poland and France.

Bloch, a man of engaging wit, studied law and economics at the University of Lwow, Poland, added postgraduate studies at the University of Grenoble, France and at New York University.

Bloch joined Warwick Wax in 1944 as midwestern sales manager; two years later he became sales manager, then moved into his present slot. Bloch says that to do justice to his demanding job, he must cover about 100,000 miles/year calling on wax consumers. Seventy-five percent of the time, he's on the road. Much of the material in this CHEMICAL WEEK report was gleaned on his latest trip across country, from which he returned just two weeks ago.

rubber to its large users of laminating grades of wax.

The phenomenal growth of laminating-coating grades of microwaxes has been limited so far only by their short supply. The best available data indicates that in 1957, an estimated 102 million lbs./year of laminating and coating grade microwaxes were consumed. By 1965, demand will hit an estimated 152 million lbs./year; 210 million lbs. by 1975.

Lower plastic film and metal foil prices will permit even wider employment of plastics and foils in laminated packaging, thus hiking microcrystalline wax demand. Recent example of this trend: sugar-coated breakfast cereal packed in metal-foil laminate.

Miscellaneous food board: Demand for waxed products such as milk-bottle hoods, lid cover stock and liquid-tight container stock (fostered by the popularity of automatic canteens and growth of in-plant feeding) has shown a steady increase since 1954. Today, paraffin tonnages that go into such packs have reached an estimated 57.4 million lbs./year. Conservative estimates put the future demand at 98.7 million lbs./year by 1965; 141.1 million lbs./year by 1975.

By order of size, the 17 prime markets for waxes line up this way: paper and packaging, 82.4%; candles, 5.0%; polishes, 2.4%; carbon paper and inks, 2.1%; chlorinated paraffins, 2.0%; explosives, 1.7%; electrical, 0.9%; rubber, 0.9%; textiles and cordage, 0.8%; matches, 0.4% cosmetics, 0.4%; chewing gum, 0.3%; leather, 0.3%; investment casting, 0.1%; paints, varnishes and paint removers, 0.1%; rust preventives, 0.1%; fruit and vegetable coatings, 0.1%.

From here on, this CHEMICAL WEEK report focuses on the 16 non-packaging outlets that account for 17.6% of wax tonnage consumed.

Candles: Currently, candles consume 68.2 million lbs./year of waxes —97.8% of the demand is for paraffins, 2.2% is for animal waxes (beeswax mainly).

About 10 years ago, the last of the petroleum refiners (Socony) quit competing with its own wax customers and cleared out of candle making.

Today, there are about 74 candle producers, ranging in size from the largest — Will & Baumer Candle Co., Inc. (Syracuse, N.Y.), which accounts for about 20% of the dollar volume of candle business — to very small localized producers with one or two employees. Only about six companies (who share 60% of the market) employ more than 100 workers; 20 firms employ more than 20 workers each.

Candle making is a $31.1-million/-year business that's destined to reach an estimated $37.2 million/-year by 1960, $40.8 million by 1965. Paraffin wax is the largest volume raw material consumed. The candle industry is expected to consume paraffins at a rate of 70 million lbs./-year by 1960.

By far, the largest volume sellers (55% of the market) are low-cost candles for religious uses. Fancy candles for household and museum uses (35% of the market) are growing fast in volume, in keeping with high-style consumer buying trends. Government purchases amount to 2-3% of the total market each year; little growth is expected here during the next few years. The market for so-called "common" candles (bought by hotels, railroads and public buildings in accordance with legal regulations) is rapidly falling off.

A regional breakdown of the candle market reveals that of the $31.1 million/year worth of candles sold in 1957, New York State accounts for $19.0 million (40.8 million lbs. of paraffin).

Candle producers are improving standard formulations to broaden their markets. Some candle makers

have gone all out on studies to determine consumer preferences for fancy-candle color and design. Newer items such as do-it-yourself candle kits, consumer packaged wax, sculpture wax, wax novelties and insect-repellent-bearing wax candles (all of which amount to a $3-4 million/year specialty nugget) are being loudly touted.

Even with all this forward thinking by candle producers, production methods still leave much to be desired because of the inordinate emphasis that's still placed on hand labor. Work is being done, however, on upgrading production methods.

Polishes: When you talk polishes, you're talking about a legion of products that range in composition from wax pastes and emulsions to synthetic resin emulsions that contain little or no wax. The entire polish industry is close to a $220 million/year business today; 40% of the sales are for household floor polishes. By 1970 the polish industry will hover around $330 million.

As the No. 3 consumer of waxes (32.6 million pounds of all types were used in 1957), the polish industry differs from most other big wax markets in that demand runs the gamut of all five wax types. Last year, polishes consumed 20.6 million pounds of paraffin waxes and oxidized microcrystallines, 6.4 million pounds of vegetable waxes (mostly Brazilian carnauba), 1.0 million pounds of animal waxes (mostly beeswax), 2.1 million pounds of mineral waxes (mostly montan) and 2.5 million pounds of synthetic waxes (mostly Fischer-Tropsch as well as Gersthofen types). Synthetic resins—e.g., polystyrenes, polyacrylics and alkali-soluble phenolic or maleic resins—were consumed in addition.

Next to the paper and packaging market for waxes, polishes are probably the most volatile of all wax markets. Reason: the polish industry is subject to all the vagaries of: 1) international economics because of its tie-in with carnauba; 2) fast changing technological developments in and out of the wax industry; 3) ultra-keen competition; 4) shifting preferences on the part of consuming housewives.

The outlook for waxes in this field is changing. Trends in the polish industry are not now clear. How much is clear?

Generally, the polish industry is swinging toward greater use of synthetic resins in emulsion polishes, especially floor polish. In retail markets, resin emulsions are dominant. But, even though resin emulsion floor polish sales are on the increase, waxes are still gaining ground. Reason: waxes give emulsion polishes better balance of characteristics by acting as plasticizers in the resin-shellac systems, thus enhancing durability of polish films.

In industrial polish markets, where low unit cost is always a big consideration, wax-containing polishes outstrip all other competition.

The big polish manufacturers are tending to diversify vertically, thus strengthening their raw-materials base by producing their own resins. It's conceivable, too, that eventually—maybe within the next five years—they'll be diversifying horizontally as well, looking for markets for their captive resin production. And having acquired a taste for these, they will expand their basic chemicals production and sales.

Raw materials suppliers, both of resins and waxes, are being called upon to play a more vital role in polish manufacture. Polish makers count on resin and wax suppliers to assist in developing salable new products, to come up with new raw materials that will gain production or marketing advantages.

What's the wax industry's stake in all of this? Whereas 10 to 15 years ago, consumption of carnauba in the polish field approached 10 million lbs./year, carnauba demand is now a little over 6 million lbs./year. And polish sales have increased considerably over this period. Carnauba's decline is partly due to the advent of resin emulsions and partly due to oxidized microcrystalline waxes.

Today, a total of 12 million lbs./year of oxidized microwaxes are produced in the U. S. Over 95% of the production is sold to the polish industry. Oxidized waxes—which have ranged from 30-50c/lb.—took the pressure off carnauba users when carnauba prices went as high as $2.00/lb. Many polish manufacturers have learned to live without carnauba and still produce high-quality polishes.

Carnauba will never lose its hard-core following, however. Of the 20 million lbs./year produced overseas, the U. S. takes 60%. Roughly, one-third of this goes to the polish industry, one-third to the carbon-paper industry and one-third to all other wax-consuming industries.

Despite the advent of resin emulsion polishes, oxidized-wax consumption is growing. Technological improvements are continually being made in these waxes. Resin emulsion polish manufacturers, moreover, continue to incorporate oxidized waxes in their formulations.

In general, then, waxes are more than holding their own in the polish market. Growing demand for polishes is the result of population growth and increases in the U. S. standard of living. But all polish producers regard the future with some wariness. There's always the chance that some day an automobile manufacturer will produce a car with a permanent gloss finish requiring no polish. A similar occurrence is possible in the floor-covering field.

Just 4 years ago, in fact, polish makers were alarmed by the growing popularity of vinyl flooring. They feared severe damage to floor polish markets. Experience proved otherwise, but the scare is still fresh in polish makers' memories.

Despite scares of this kind, polish producers will continue to diversify their polish lines, improve formulations, tout new ingredients, including waxes of all conceivable varieties, to make their polish lines as invulnerable as possible to competition.

In this fortification of market position, a strong patent position counts heavily. For this reason, many of the big polish companies are busy building up a backlog of patented claims for new polish products.

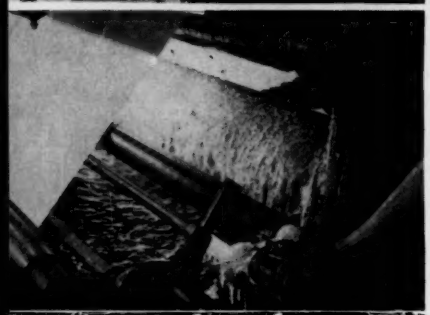
More Big Markets: Carbon paper and inked ribbon, chlorinated paraffins, and explosives respectively account for 2.1%, 2.0% and 1.7% of total wax demand.

The carbon-paper and inked-ribbon industry is a $96-million/year segment of the $437-million/year business-forms industry.

Carbon paper and inked ribbons currently use 28.0 million lbs./year of waxes. Breakdown: 22.5 million lbs./year for petroleum waxes, mostly paraffins; 5.5 million lbs./year for vegetable waxes, mainly carnauba, ouricury and sugar-cane waxes. Some mined montan, from lignites, is also

Who's Who in Wax Production, Blending, Trade

Here's a listing of 75 wax producers, blenders and formulators, importers and exporters—the nucleus of the wax industry.



Producers

American Lignite Products Co., P.O. Box 5, Ione, Calif.
Armour & Co., 1355 W. 31st, Chicago 9, Ill.
Atlantic Refining Co., 260 S. Broad St., Phila., Pa.
Baker Castor Oil Co., 40 Avenue A, Bayonne, N.J.
Bareco Wax Co. Division, Petrolite Corp., P.O. Box 390, Kilgore, Tex.
Cane Wax Enterprise, 347 Madison Ave., N.Y. 16, N.Y.
Champlin Oil & Refining Co., 135 S. LaSalle St., Chicago 3, Ill.
Cities Service Oil Co., Cities Service Bldg., Bartlesville, Okla.
Continental Oil Co., 630 5th Avenue, N.Y. 20, N.Y.
Cooperative Refinery Assn., P.O. Box 2359, Kansas City 42, Mo.
Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland, O.
Esso Standard Oil Co., 15 W. 51st St., N.Y. 19, N.Y.
Glyco Products Co., Inc., 350 5th Ave., N.Y. 1, N.Y.
Gulf Oil Corp., P.O. Box 1166, Pittsburgh 30, Pa.
Pennsylvania Refining Co., 104 S. Main St., Butler, Pa.
Phillips Petroleum Co., Special Products Division, Bartlesville, Okla.

Blenders and formulators

Allied Asphalt & Mineral Corp., 217 Broadway, N.Y. 7, N.Y.
M. Argueso & Co., Inc., 441 Waverly Pl., Mamaroneck, N.Y.
Boler Petroleum Co., Boler Bldg., 119 Coulter Ave., Ardmore, Pa.
Candy & Co., Inc., 2515 W. 35th St., Chicago 32, Ill.
Concord Chemical Co., Inc., 205 S. 2nd St., Camden 1, N.J.
Cornelius Wax Refining, Division G. S. Ziegler & Co., Box D, Dunellen, New Market, N.J.
Delta Petroleum Co., Inc., P.O. Box 7335, New Orleans 19, La.
L. A. Dreyfus Co., Park Ave. and Oak Tree Rd., Oak Tree, N.J.
Industrial Raw Materials Corp., 575 Madison Ave., N.Y. 22, N.Y.
Kalamazoo Paraffine Co., 1809 Reed St., Kalamazoo, Mich.

Importers and exporters

M. Argueso & Co., Inc., 441 Waverly Pl., Mamaroneck, N.Y.
Biddle Sawyer Corp., 20 Vesey St., N.Y. 7, N.Y.
E. A. Bromund Co., Myrtle Ave., Boonton, N.J.
Cornelius Wax Refining, Division G. S. Ziegler & Co., Box D, Dunellen, New Market, N.J.
William Diehl & Co., 120 E. 56th St., N.Y. 22, N.Y.
Distributing and Trading Co., Inc., 444 Madison Ave., N.Y. 22, N.Y.
Dura Commodities Corp., 20 Vesey St., N.Y. 7, N.Y.
S. Henle Inc., 12 East 42nd St., N.Y. 17, N.Y.
Industrial Raw Materials Corp., 575 Madison Ave., N.Y. 22, N.Y.
Koster Keunen Mfg. Co., Inc., Bourne Blvd., Sayville, N.Y.

Pure Oil Co., 35 E. Wacker Dr., Chicago 1, Ill.
Quaker State Oil Refining Corp., Quaker State Bldg., Oil City, Pa.
Shell Oil Co., 50 W. 50th St., N.Y. 20, N.Y.
Sinclair Refining Co., 600 5th Ave., N.Y. 20, N.Y.
Socony Mobil Oil Co., 150 E. 42nd St., N.Y. 17, N.Y.
L. Sonneborn Sons, Inc., 300 4th Ave., N.Y. 10, N. Y.
Standard Oil Co. of Calif., 225 Bush St., San Francisco 20, Calif.
Standard Oil Co. (Ind.), 910 S. Michigan Ave., Chicago 80, Ill.
The Standard Oil Co. (Ohio), Midland Bldg., Cleveland 15, O.
Sun Oil Co., 1608 Walnut St., Phila. 3, Pa.
DX Sunray Oil Co., P.O. Box 381 Tulsa 2, Okla.
Texas Co., 135 E. 42nd St., N.Y. 17, N.Y.
Union Carbide Corp., 30 E. 42nd St., N.Y. 17, N.Y.
Union Oil Co. of Calif., 617 W. 7th St., Los Angeles 17, Calif.
Warwick Wax Co., Inc., subsidiary of Sun Chemical Corp., 750 3rd Ave., N.Y. 17, N.Y.

Koster Keunen Mfg. Co., Inc., Bourne Blvd., Sayville, N.Y.
Mitchell-Rand Mfg. Co., foot of Jersey Ave., Jersey City, N.J.
Moore & Munger, 33 Rector St., N.Y. 6, N.Y.
National Wax Co., 3650 Touhy Ave., Skokie, Ill.
Paragon Products Corp., Oshkosh, Wisc.
Pyroxylin Products Inc., 4851 S. St. Louis Ave., Chicago 32, Ill.
Frank B. Ross Co., Inc., 6-10 Ash St., Jersey City 4, N.J.
William H. Scheel, Inc., 38 Franklin St., Brooklyn 22, N.Y.
Smith & Nichols, Inc., 620 Central Ave., Carlstadt, N.J.
Strahl & Pitsch, Inc., 141 Front St., N.Y. 5, N.Y.
E. T. Trotter & Co., 594 Johnson Ave., Brooklyn 37, N.Y.
Zophar Mills, Inc., 112 26th St., Brooklyn 32, N.Y.

Mercantile Metal & Ore Corp., 595 Madison Ave., N.Y. 22, N.Y.
Moore & Munger, 33 Rector St., N.Y. 6, N.Y.
Paul J. Pauls Inc., Union Bldg., 7-9 Watchung Ave., Plainfield, N.J.
F. H. Paul & Stein Brothers Inc., 235 5th Ave., N.Y. 16, N.Y.
Petroleum Specialties Inc., 205 E. 42nd St., N.Y. 17, N.Y.
Frank B. Ross Co., Inc., 6-10 Ash St., Jersey City 4, N.J.
Smith & Nichols, Inc., 620 Central Ave., Carlstadt, N.J.
Strohmeyer & Arpe Co., 139 Franklin St., N.Y. 13, N.Y.
Wax Corp. of America, 21-29 Dunham Pl., Brooklyn 11, N.Y.
Wax & Rosin Products, 42 Broadway, N.Y. 4, N.Y.
Will & Baumer Candle Co., Inc., Liverpool Rd., Syracuse 1, N.Y.
Jacques Wolf & Co., P.O. Box 839, Passaic, N.J.

being consumed currently.

Carbon paper has helped sugar-cane waxes reach their current high demand of more than 1.0 million lbs./year. Within the next few years, as carbon-paper manufacturers shift formulations, sugar-cane wax demand will approach 3.0 million lbs./year.

One other development in the carbon-paper and inked-ribbon industry is worth noting. International Business Machines Corp. has recently begun captive production of inked ribbon at its Lexington, Ky. plant.

Petroleum refiners and chlorine producers take a total of about 25.8 million lbs./year of paraffins, which are chlorinated for use in high-pressure lubricants, oil additives, secondary vinyl plasticizers and as flame-proofing and waterproofing agents.

Total demand for waxes in explosives manufacture now stands at 22.5 million lbs./year (mainly paraffins).

PROBLEM IN PROSPECT

When the six big markets for waxes—paper and packaging, candles, polishes, carbon paper and inked ribbons, chlorinated paraffins and explosives—are lumped together, they account for 96% (or 1.27 billion lbs./year) of the total demand for waxes. The remaining 11 important user industries account for the remaining 4% (50 million lbs./year) of demand as shown on pp. 50, 51.

Over the next two decades, petroleum wax demand can be expected to more than double. Other wax types are equally assured of sizable increases in consumption.

As far as most nonpetroleum waxes are concerned, no supply problems exist. Fischer-Tropsch waxes, sugar-cane waxes and lignite waxes, as examples, offer promise of prolific production, should demand develop. Finding new uses for these waxes, not only in end-products but as chemical raw materials is the challenge.

Petroleum waxes, especially micro-waxes, are headed into supply problems. But petroleum crudes are endowed by nature with abundant quantities of wax. Basically, the problem for the petroleum industry is this: How may greater tonnages of wax be obtained economically from crudes?

Wax blenders, suppliers and users should be trying to develop ways to get greater mileage, performance and economy out of available waxes.

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U.S.I. CHEMICAL NEWS

July 19 ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1958

Urethan Applications Grow In Drug, Chemical Fields

Ethyl carbamate, more commonly known as Urethan, has become a useful chemical tool with a wide variety of uses since it was first produced in this country over 20 years ago. Urethan's applications now range from cancer therapy to the manufacture of plasticizers — and useful new reactions are continually being found.

In the pharmaceutical field, Urethan is now employed in the production of tranquilizers, and in the synthesis of many drugs. Its medical applications include the treatment of leukemia and other forms of cancer. Urethan is a mild hypnotic and sedative; is also reported to enhance the effectiveness of penicillin and streptomycin, and to increase the activity of certain enzymes.

Plasticizer producers use Urethan as a gelatinizing agent for cellulose acetate and cellulose nitrate. Cosmetic makers find it an excellent solvent in astringent preparations and hair dyes. Diazo paper manufacturers incorporate it into the light-sensitive layer to yield bright, stable prints.

Urethan is the ethyl ester of carbamic acid and has the chemical formula

$$H_2N-\overset{\overset{O}{\|}}{C}-O-C_2H_5$$

As a chemical intermediate, it reacts with many organic and inorganic compounds to form end products or other intermediates of commercial importance in the dyestuffs, plasticizer, food and drug fields among others.

U.S.I., pioneer producer of Urethan, has a wealth of experience with this wide-spectrum chemical, and can supply information or technical help on applications and reactions.

Polyethylene Closures for Drums Now Self-Venting

Used on U.S.I. Alcohol Drums

A leak-proof, tamper-proof, all-polyethylene closure for containers carrying liquids—tradenamed FlexSpout* — now has a self-venting feature which eliminates the need for other separate vents on shipping containers. The improved spout

MORE

*® Rieke Metal Products, Auburn, Ind.

Self Venting FlexSpout on U.S.I. Pure Ethyl Alcohol, USP, 5-gallon drum being pulled up into pouring position via new bail on reseal cap.

Promising New Sodium Treatment Developed for Bonding Teflon

Sodium-Naphthalene-Solvent Treatment Claimed More Convenient Than Earlier Teflon Preparation for Strong Bonding to Metals, Rubber and Plastics

A new surface treatment has been developed for joining fluorinated resins such as Teflon to other materials. The resulting ease of bonding will undoubtedly increase Teflon utilization as a corrosion-resistant lining for process equipment and vessels, as a bearing material, and in fluid seals.

The new process, described in U.S. Patent 2,809,130, requires only conventional ventilation, and uses treating solutions that can be stored for long periods. Its advantages over the sodium-ammonia solution surface treatment should bring the new process into wide application for preparing Teflon for adhesion to metals, rubber and plastics.

Bond Strengths Are High

It is reported in the patent that peel tests were made on an epoxy cement bond between the treated Teflon and a phenol-formaldehyde resin — and that the bond was stronger than the Teflon itself. Similar results were obtained in joining Teflon to metal and rubber with a chlorinated rubber adhesive.

How It Is Done

The Teflon surface is bathed at room temperature with a sodium-naphthalene complex dissolved in a solvent such as dimethyl glycol ether. When the surface turns a grey-brown, it is ready for bonding to other materials. A wide variety of common adhesives can be used, including chlorinated rubber types, resorcinol formaldehyde cements, phenolic types, and epoxies.

Preparation of Treating Solutions

The patent gives a specific example of solution preparation as follows: a liter of a molal solution of naphthalene in a dimethyl glycol ether solvent under a nitrogen blanket is

MORE

Largest All-Nuclear Power Plant to Contain 44 Miles Of Zirconium Tubing

At Dresden, Illinois, a 180,000 KW all-nuclear power station is being constructed which will contain in its reactor core almost 44 miles of tubing made from zirconium. This Commonwealth Edison boiling water reactor plant will be the largest all-nuclear station in the U.S. when it begins operation in mid-1960.

The tubing is made of reactor-grade Zircaloy-2 and is used as a container for UO_2 fuel pellets. It is to be given special pressure, sonic and corrosion tests, to insure that it

Sphere to house reactor, and turbine building, for Commonwealth Edison's Dresden, Ill., power plant — to be country's largest all-nuclear station when completed in 1960. Reactor will contain 44 miles of zirconium tubing. (photo courtesy General Electric)

meets the rigid tolerances established for this type of tubing.

Zirconium metal has an extremely low nuclear cross-section — allowing free passage of neutrons—and makes an ideal cladding material for uranium because it offers minimum interference to the fission process, is corrosion and heat resistant, and structurally strong.

This zirconium tubing order, the largest ever placed, is being processed by Mallory-Sharon Metals Corporation (owned ⅓ by U.S.I.), world's largest producer of special metals such as titanium, hafnium, zirconium, tantalum and columbium. The company uses a U.S.I. sodium reduction manufacturing process which offers advantages in both economy and product quality.

Another ISOSEBACIC® *Acid Patent for U.S.I.*

U.S. Patent No. 2,822,389 on the separation of C-10 dicarboxylic acids has been granted to U.S.I. It is the ninth patent U.S.I. has obtained on its manufacturing process for ISOSEBACIC acid — a new intermediate for the plastics industry. The material is a mixture of three C-10 dibasic acids — 2-ethylsuberic acid, and 2,5-diethyladipic acid, and sebacic acid.

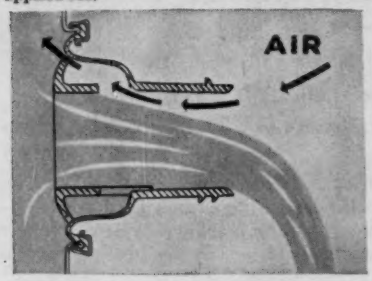
A plant to produce ISOSEBACIC acid in commercial quantity is now being completed at U.S.I.'s major chemical complex in Tuscola, Illinois. Potential applications of the new intermediate include the manufacture of plasticizers, ester lubricants, alkyds, polyamides, polyurethanes, reinforced plastics and in chemical synthesis.

July 19 ★ **U.S.I. CHEMICAL NEWS** ★ 1958

CONTINUED

Polyethylene Closures

also eliminates liquid surge or "glug" in pouring. It is claimed that there is no waste or spillage, since the closure will vent in any pouring position, and a controlled flow—large or small—can be maintained. Patent has been applied for.



Cross-section of Self Venting FlexSpout closure.

The new FlexSpout, like the old, is normally recessed during shipping and storage and can be extended for pouring. Addition of a bail to the polyethylene cap, however, makes it easy to pull the spout up into pouring position.

This improved closure will soon be on all 5-gallon containers in which U.S.I. ethyl alcohol is shipped. It offers greater convenience in handling and pouring.

CONTINUED

Teflon

reacted with metallic sodium. Formation of the sodium-naphthalene complex is indicated by the appearance of a greenish color, at which point the Teflon is immersed.

Other investigators have cited the use of finely divided sodium dispersed in xylene or white oil. Preparation and handling are described in a U.S.I. brochure, "Sodium Dispersions" which may be obtained on request.

Those who will be employing metallic sodium for the first time when applying this treatment will find valuable information in U.S.I.'s 40-page book, "Handling Metallic Sodium on a Plant Scale." The book is available from U.S.I. without charge.

Cabot's Extrafine Silica Now Made at Tuscola, Ill.

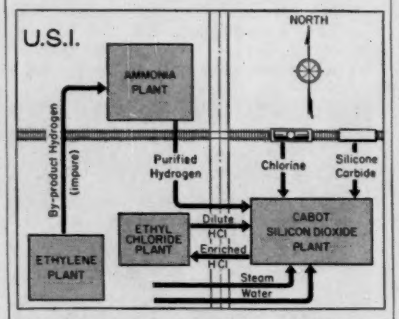
New Plant is Integrated with U.S.I. Production Facilities

A five million pound per year plant for the production of finely-divided silicon dioxide is now onstream at Tuscola, Illinois. Godfrey L. Cabot, Inc. has been importing the product, Cab-O-Sil®, from Germany since 1952. The new Cabot plant is the first in this country to make silica by the German process.

Cab-O-Sil's unique properties are said to derive from this method of manufacture which involves the vapor-phase hydrolysis of silicon tetrachloride in a hot hydrogen environment. The silicon dioxide produced has a particle diameter of 15-20 millimicrons, surface area of 175-200 square meters per gram, purity of 99.99.7%. It has found application in reinforcing rubber polymers, producing stable lubricating greases, coating reproduction papers, adjusting viscosity of paints and inks, and controlling flow properties of a wide variety of industrial powders and liquids.

Cabot chose Tuscola as a plant site because of its economic advantages. Located near U.S.I.'s ammonia and ethyl chloride facilities, the new Cabot plant utilizes raw materials supplied by the U.S.I. processing units, and the U.S.I. ethyl chloride plant uses byproduct hydrogen chloride from Cabot.

® Godfrey L. Cabot, Inc.



Flowsheet showing interrelation of U.S.I. and Cabot plants at Tuscola, Illinois.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Glass acid bulbs for accurate quantitative analysis of fuming acids, toxic or volatile chemicals, etc., can now be purchased in commercial quantity. They are said to be of controlled diameter, weight, uniformity of wall thickness; can be made in any desired size. **No. 1370**

Portable kit for field testing of non-fat milk solids is now available. Permits quick determination of solids content before milk goes to dairy. Consists of portable water bath, milk sample tubes, lactometers; weighs 40 lbs. **No. 1371**

Antibacterial compound just developed is claimed nontoxic, nonirritating, noncorrosive, odorless, tasteless, water soluble. This complex silver compound is suggested for liquid soaps, toilet goods, other similar products. **No. 1372**

New pump eliminates contact of moving parts with fluid handled. Intake and outlet consists of one flexible tube passing through pump body, and acted upon by kneading action of double rotor. Handles corrosives and abrasives. **No. 1373**

Molybdenum pentachloride — active catalyst for chlorinating aromatics, Friedel-Crafts alkylations and like reactions — can now be obtained in semiworks quantities. Also "plates" molybdenum when reduced by hydrogen. **No. 1374**

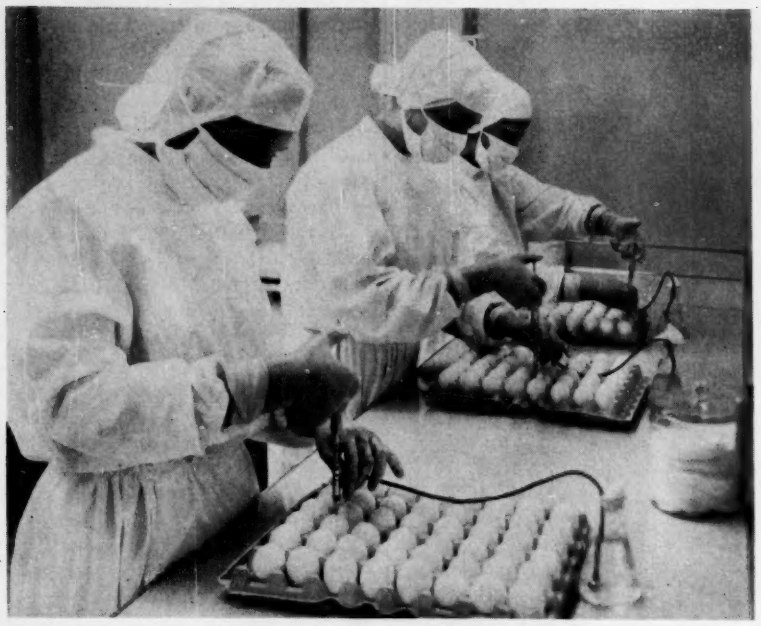
New needle-and-glass syringe combination packed in sterile polyethylene bag is now available. Entire unit is designed to be discarded after use. Glass barrel unaffected by solvents during long contact with parenteral fluids. **No. 1375**

All phases of the flexographic printing process are covered in a new, revised, updated edition of an older book. Now on sale, new volume includes sections on copy preparation and halftone printing by flexography. **No. 1376**

New centrifugal filming machine for sterilizing sensitive biological fluids and producing high-potency vaccines by ultraviolet irradiation now in production. Suggested for polio vaccines, blood plasma, liquid foods. **No. 1377**

Fiber glass finishing agent which establishes a better bond between fibers and resins is now available in semiworks quantity. Reported to give better wet and dry strengths to polyester, epoxy, melamine, phenolic laminates. **No. 1378**

For liquid oxygen systems, new thread sealing compound is now available. Is specifically formulated for negligible impact sensitivity, is claimed to have approval of several rocket motor manufacturers. **No. 1379**



Polyvalent influenza vaccine starts with virus-in-egg cultures.

Hatching Versatile Vaccines

This week, Merck Sharp & Dohme is preparing for commercial production of its Tetravax, a four-in-one vaccine designed to immunize children against polio, whooping cough, diphtheria, and tetanus. Aimed at the same market (and diseases) as Parke, Davis's newly disclosed Quadrigen (CW Technology Newsletter, July 5), the new vaccine highlights the pharmaceutical industry's striving for more versatile, multipurpose vaccines.

To some pharmaceutical researchers, the new products* represent more than keeping down the number and volume of injections children now receive. Both Quadrigen and Tetravax, these researchers feel, are milestones toward the polyvalent vaccine that may some day grant immunity from as many as thirty diseases. Aside from that, drugmakers regard the vaccines as fresh evidence that chemotherapy research—to find chemical antiviral agents—is sadly behind the study of vaccines that will combat virus diseases.

*These vaccines must be licensed by the National Institutes of Health before they can be sold. But in view of the good clinical records of both, such licensing should be forthcoming soon.

Broad-Spectrum Vaccines? The promise held by these more versatile vaccines is so great that companies that once made only drugs are now hedging their virus chemotherapy work with vaccine research. For example, Pfizer has recently begun making four- and six-strain influenza vaccines, and has several other vaccine theories under investigation at its new biologicals center near Terre Haute, Ind. One of these calls for putting as many antigens as possible on a common carrier, such as an ion exchange resin. (An antigen is a protein normally not present in the body. It causes formation of antibodies to combat it, when it enters the blood stream.) Object: a broad-spectrum vaccine.

Pitman-Moore Co. division of Allied Laboratories (Indianapolis), also sees a trend toward multiple vaccines and is devoting a lot of time and effort to the field. And probably all drug manufacturers making Salk polio vaccine are considering the addition of other antiviral agents to it—to provide protection from such groups as the Coxsackie and ECHO viruses (both of which have recently been found to share polio's ability to cause paralysis), adenoviruses, flu, mumps, measles and the like.

Practical Hope? Robert Huebner, chief of the Laboratory of Infectious Diseases, National Institute of Allergy and Infectious Diseases (Bethesda, Md.) considers a thirty-virus vaccine a practical hope for the future. But he is making no predictions on when, if ever, such a vaccine will be developed. Emphasizing the practicality of a thirty-in-one vaccine is the fact that monovalent vaccines for each of the seventy respiratory and other undifferentiated disease viruses classified in the last decade would be impractical to develop.

"No one," says Huebner, "is going to bare his arm for seventy separate injections and no doctor is going to ask a patient to subject himself to such an ordeal—particularly when so many of these viral infections are of relatively minor consequence and primarily afflict small children." A multiviral vaccine,† offering immunity against a fairly large number of viral diseases (perhaps as many as 30) would be a different matter.

Huebner's laboratory is currently testing polyvalent vaccines, combining several adenoviruses, produced by industry for experimental work. He's al-

†A multiviral vaccine is a combination of several vaccines in a single product, not a single vaccine effective against several viruses.

Packaging a small vaccine lot.

so testing a polyvalent Coxsackie B vaccine and a new polyvalent Asian flu vaccine. Recently, tests were started on a measles vaccine. And Huebner hopes to test some new vaccines for viral respiratory diseases next year.

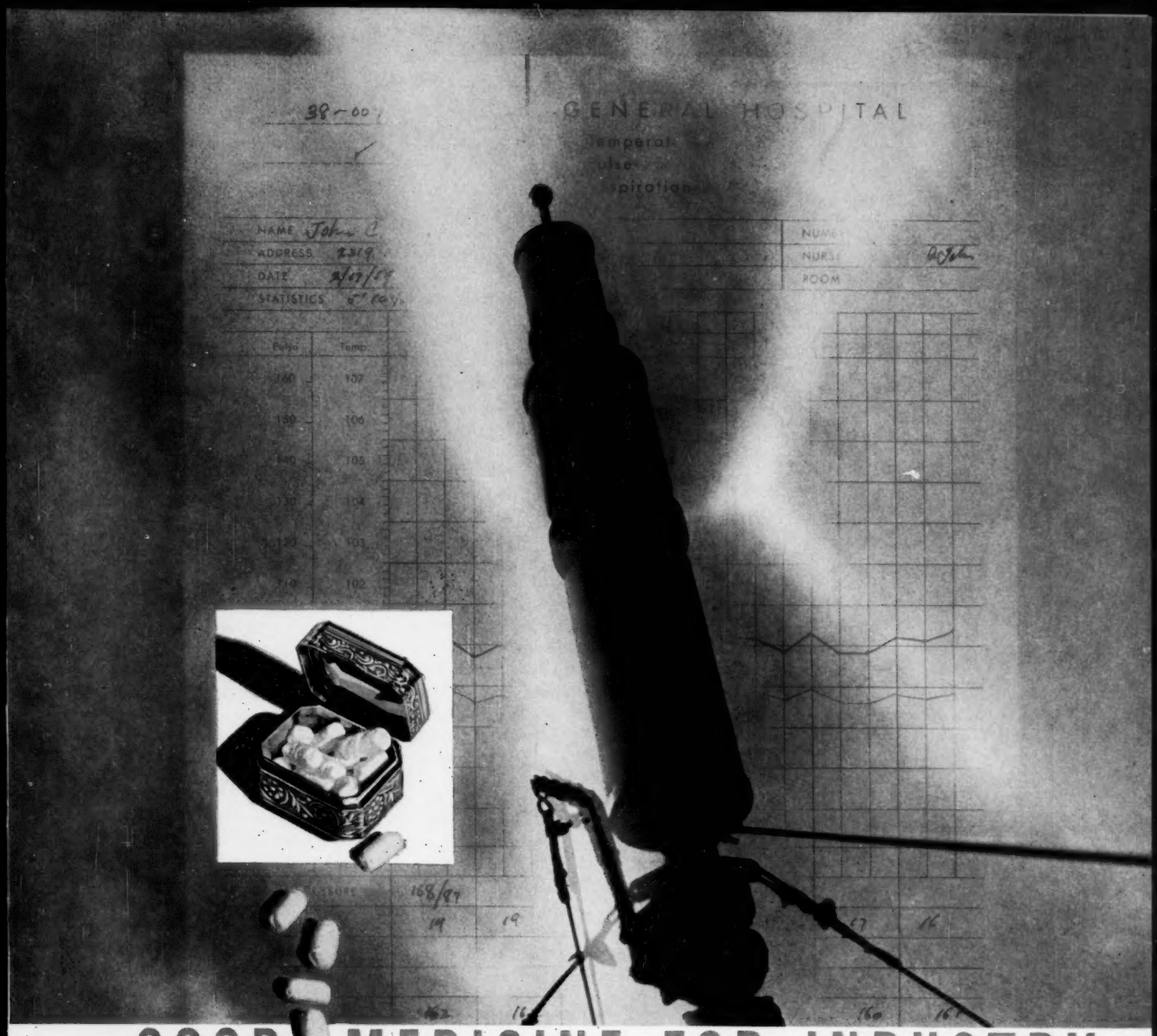
Production Headache: Huebner's lab is mainly concerned with improving methods of purifying vaccines and similar technical projects. These are tied in with the serious problem of finding methods of growing large quantities of the viruses needed for vaccines.

However, the way leading to broad-spectrum vaccines is more intricate than the mere production of high-yield cultures. (Significantly, the idea of such vaccines is about 25 years old, and, though achieved with diagnostic antigens, is still a long way from utilization in medical practice). Some of the problems:

- Some vaccines aren't very potent. Diluted in mixtures they may lose their efficacy.
- Some aren't compatible. The preservative merthiolate, normally used in diphtheria-whooping cough-tetanus vaccine destroys the polio vaccine's potency. So it is omitted from P,D's Quadrigen.
- Some vaccines can be freeze-dried. Others (e.g., that for polio) cannot.
- Vaccines must be tailored to fit a particular population. Certain animal tissue can't be used to grow vaccines intended for use in some parts of India, for example (for religious reasons). Similarly, the requirements for children's vaccines vary in different parts of the world.

Chemical Antivirals: Despite the activity in vaccine research, drug firms aren't giving up on chemicals as potential weapons against virus diseases. They point out that vaccines for bacteria-caused diseases predated the sulfa drugs and antibiotics and that history may repeat itself in the case of virus diseases. So far, though, no chemical that indisputably cures a single true-virus disease has been turned up. But the hunt is continually going on, even expanding to include broad-spectrum chemical antivirals (*CW, Aug. 18, '56, p. 80*).

Some recently published data shows chemical antiviral research spreading in all directions. Merck Sharp and Dohme synthesized a series of oxo-



GOOD MEDICINE FOR INDUSTRY

PENTAERYTHRITOL IN PELLETIZED FORM

A new prescription for plants processing with pentaerythritol: Celanese Pelletized PE. In pellet form, PE can be handled more cleanly. When reactors are charged, the problem of dusting is virtually eliminated. Up-the-stack losses disappear, and operational safety increases. In addition, tests indicate that PE in the new, pellet form handles easier—in transit . . . in storage—and actually helps to shorten cooking time. This development in product improvement is a typical result of the Celanese policy of doing business by thinking about yours.

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Pentaerythritol is a polyhydric alcohol in white crystallized form. Its principal use is in the production of alkyd resins and rosin esters, which account for over 9/10 of current applications. As a major producer of PE in three grades (technical crystals, pure crystals and technical pellets), Celanese is basic in the raw materials required for this useful industrial chemical.

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hexanoic acids and found many of the derivatives to have antiviral activity against certain influenza vaccines. The most potent was L-4-(*o*-chlorobenzyl)-4-phenyl-5-oxohexanoic acid. But concomitant toxicity has stymied its progress.

Riker Laboratories (Los Angeles) synthesized 89 derivatives of urea, found diphenyl carbamyl chloride produced a significant therapeutic effect in mice when given simultaneously with influenza virus.

A series of serine derivatives (serine is β — hydroxy alanine, an amino acid) were tested for antiviral action by Boots Pure Drug Co. Ltd., (Nottingham, England). In tissue cultures, some were effective against influenza A.

Ciba has patented (Swiss patent 322,061) polyureas such as that derived from di-sodium 4,4′-diaminostilbene-2,2′-disulfonate as having distinct antivirus activity—though Ciba says these particular compounds aren't getting more study. And Japanese patent 5343 to Dai Nippon Drug Co. covers 3-alkylphenylazo-4-hydroxynaphthalene sulfonic acid and derivatives as strong antivirals.

For one reason or another, hopeful chemical antivirals are falling by the wayside. One of these days, their proponents hope, a successful one will come along, making the sting of vaccination a needless discomfort. But until then, drugmakers are putting more emphasis on multipurpose vaccines.

AEC Lab Contract

Vitro Engineering Co., division of Vitro Corp. of America (New York), will make a feasibility study of an ultra high-level radiation laboratory. Contract was awarded last week by Associated Universities, Inc., operators of Brookhaven National Laboratory for Atomic Energy Commission. Object: handling of more intense radiation sources than yet fabricated.

Food Center: AEC is also firming up plans with Curtiss-Wright Corp. to build a large laboratory for experiment in using atomic radiation for food preservation. The new facility is to be a part of the U. S. Army ionizing radiation center in Lathrop, Calif. Later, the Quartermaster Corps will take it over as part of its food preservation project. The irradiator to be built for the new installation will require 2 million curies of cobalt 60, more than three times the total amount now being used in the U. S.

REPORTS

Atomic Energy Commission reports concerning chemistry are available from Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C.:

• "Ruthenium Behavior in Nitric Acid Distillation" (HW-45620, 30¢); "Surface Tensions of Some Binary Fused Salt Systems" (ISC-923, $2.25); "Carbon-14 Carboxy-Labeled Polysaccharides" (NBS-5792, 50¢) "A Combined Distillation-Electrochemical Method of Recovery of Hydrofluoric Acid" (ORNL-2038, 30¢); "Isotopes in Biochemistry and Biosynthesis of Labeled Compounds: A Selected List of References" (TID-3513, $2.25); "Chemical Effects of Photonuclear Reactions in the Propyl Bromides" (ISC-855, $2.25); "Several Spallation Reactions of Uranium-238 plus Helium-4" (UCRL-8186, $1.).

PRODUCTS

Nitrogen Novelties: Four new nitrogen heterocyclics are available from Ansul Chemical Co. (Marinette, Wis.). They are: N-butylene pyrrolidine; N-methyl pyrrolidine; 3,5-dibutyl pyridine and 3,5-dimethyl pyridine. Potential applications of the first two are as pharmaceutical and chemical intermediates. The 3,5 dibutyl pyridine is suggested as a heat transfer medium and 3,5 dimethyl pyridine is aimed toward solvent and organic synthesis uses.

•

Urethane Entry: A urethane floor finish that retains its gloss and usefulness two to three times longer than varnishes is being field tested by Du Pont's Finishes Division. Requiring special handling the product may not be marketed for "do-it-yourselfers". Du Pont thinks schools will adopt the finish for such uses as surfacing gym floors.

•

Chloranilic Salts: Matheson Coleman & Bell Division of Matheson Co. Inc. (Norwood, O.) is now selling chloranilic acid (2,5-dichloro-3,6-dihydroxy-*p*-benzoquinone) as well as three of its salts: barium chloranilate,

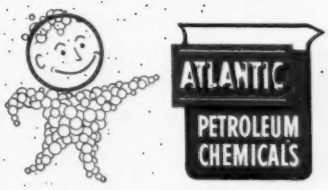
The ULTRAWETS wet, penetrate, clean, emulsify

Professional's "secret"–
Atlantic ULTRAWET 60L

Professional hairdressers and beauticians have discovered the advantages of shampoos made with ULTRAWET 60L. This unique cosmetic grade alkyl aryl sulfonate is easy on the scalp, and leaves hair soft and lustrous.

ULTRAWET 60L is a pale yellow, viscous liquid composed of 60% organic alkyl aryl sulfonate and 40% water. It is immediately soluble in water and is clear and bright even at temperatures below 20° F.

Take a tip from the pros. Investigate Atlantic ULTRAWET 60L for *your* shampoo formulations. For full information, write or wire Chemicals Division, The Atlantic Refining Company, 260 South Broad Street, Philadelphia 1, Pennsylvania.



Philadelphia, Providence, Charlotte, Chicago

In Canada: Naugatuck Chemicals Division of Dominion Rubber Co., Ltd.

In Europe: Atlantic Chemicals SAB, Antwerp, Belgium

In South America: Atlantic Refining Company of Brazil, Rio de Janeiro

RESEARCH

mercuric chloranilate and strontium chloranilate. The salts are suggested for use in spectrophotometric determination of sulfates, chlorides and fluorides, respectively.

•

Vitamin E: A 33% active content dry-powder form of vitamin E (DL-α-tocopherol acetate) is the latest entry of Hoffmann-La Roche Inc. (Nutley, N.J.).

EXPANSION

• Wyandotte Chemicals Corp. (Wyandotte, Mich.) has expanded its research facilities to permit increased work on new fuels, lubricants, elastomers, and polymers.

• Du Pont of Canada will build a technical laboratory costing about $700,000 at its Maitland Works, on the St. Lawrence River between Brockville and Prescott, Ont.

• A microradiographic laboratory for taking X-ray pictures of microscopic bits of tissue — the first of its kind in the U.S. — has been established at the University of California Medical School (Los Angeles).

It's expected to help researchers fathom the vital processes of cells (such as those in human glands) as well as the roles of vitamins, enzymes and minerals in living tissues.

• American Potash & Chemical Corp. (Los Angeles) has formed a glass technology section to deal with the glass industry — user of increasing amounts of AP&CC's boron, lithium, potassium, rubidium, cesium and other compounds.

• Abbott Laboratories (North Chicago) has broken ground for a major research center addition, the largest single construction project in the firm's 70-year history. The new building is the first major step in a projected five-year $20 million capital expansion program.

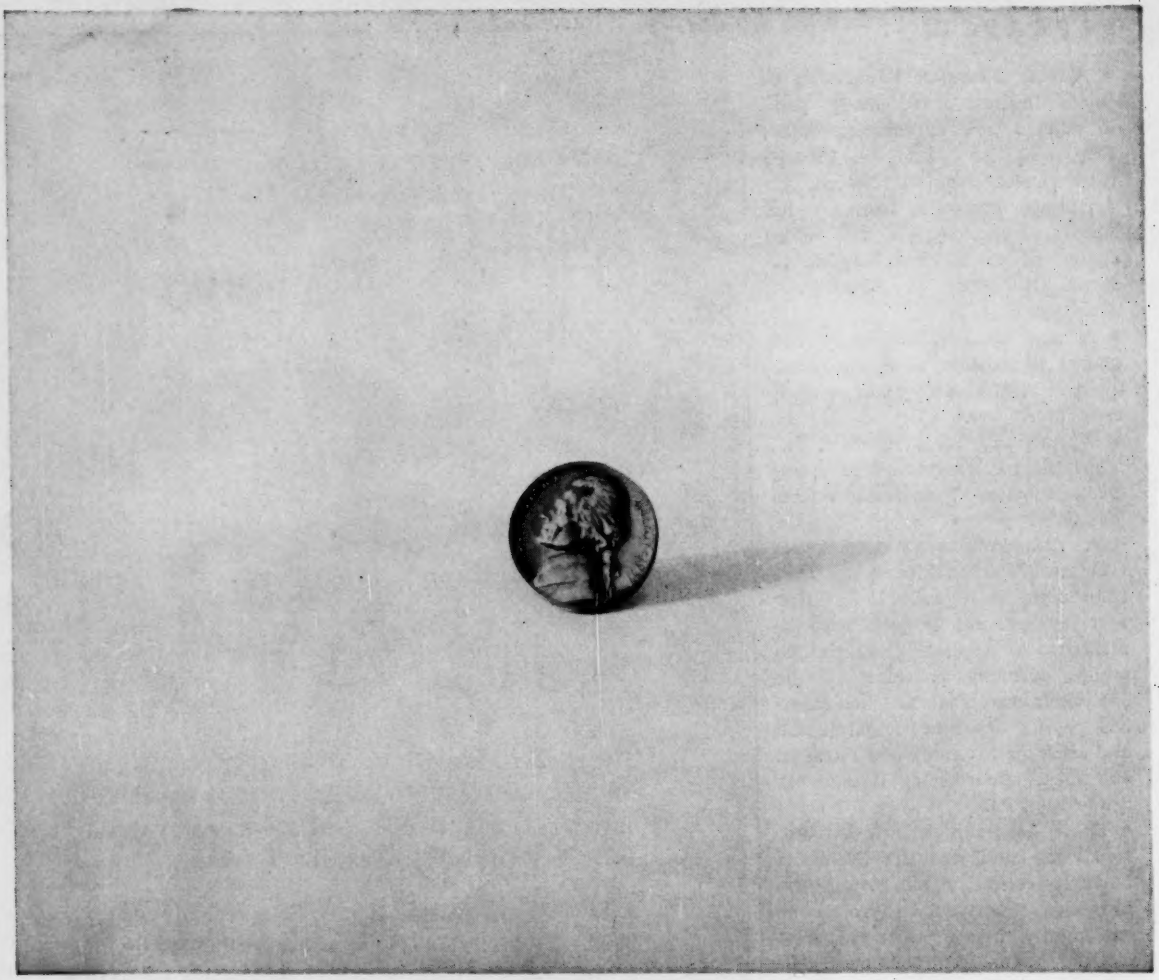
• Bradford Laboratories, oil field water consulting firm, has opened a new regional laboratory in Denver, Colorado.

• Pressed Steel Tank Co. (Milwaukee) has set up a new laboratory in Downingtown, Pa., for testing liquefied petroleum gas storage and delivery equipment.

• Wesson Metal Corp. is building a $400,000 lab near Lexington, Ky., for the development of guided-missile materials.

RESEARCH

- Armour Research Foundation of Illinois Institute of Technology plans to build a new multimillion dollar, 125,000-sq. ft. building in Chicago for expanded chemical research.
- Chicago Bridge & Iron Co. has added a spectrograph and allied equipment to its metallurgical research laboratory in Birmingham, Ala.
- A new research laboratory now under construction at Syntex headquarters in Mexico City will be ready early in August.
- Wyeth's new lab in Radnor, Pa., scheduled for completion in spring '59, will increase basic research facilities 65%.
- A research services section has been established in Mellon Institute's (Pittsburgh, Pa.) general administration division. It's to give scientific assistance to research specialists and groups formerly provided by the analytical, instrumentation, and chemical physics departments and it will also assist the Institute's new radiation and mass spectrometer facilities at Bushy Run, Pa.
- Harris Laboratories, Inc., (Lincoln, Neb.) has purchased the Lexington Laboratories (Lexington, Neb.) for research and development projects in soil fertility, uses of trace elements, and the newer fertilizers, pesticides and herbicides.
- A physics, patent and research consulting service has been opened by George Ziegler, former research director of the Zonolite Co. (Chicago). Offices are at 3020 Grant Street in Evanston, Ill.
- Delco-Remy division of General Motors (Anderson, Ind.) has formed applied science and electro-chemical research departments.
- The U. S. Dept. of Agriculture and Clemson Agricultural College plan jointly to establish a new pilot cotton-spinning research laboratory at the college in Clemson, S.C.
- Brookfield Engineering Laboratories Inc. (Stoughton, Mass.) has added a new research wing to its present facilities, will increase development of automatic viscosity recording and control systems.
- Hanson-Van Winkle-Munning Co. (Matawan, N.J.) plans to double research spending, adding facilities and personnel to broaden the company's studies in electroplating and other metal finishing processes.



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- Is saponifiable by alkali to form soaps.
- Is reactive with aldehydes to form resins.
- Is substantially insoluble in aliphatic hydrocarbons.
- Is compatible with a wide range of resins and plasticizers.

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Acid Number	94
Saponification Number	165
Gasoline Insoluble	83%
Oxygen Absorption	0.25%

Available in lump, flake, pulverized, and emulsion forms. Also as a powdered sodium soap.

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NV58-1

U.S. backyard swimming pool owners spend $10/month for specialties to keep their pools clean.

Pool Additives: $22-million/year Water Baby

In this recession year of 1958, the swimming pool specialties business tied to the swimming pool building business is booming as never before. An estimated 53,000* now-abuilding pools will be added this year to those 150,000 public and private ones already in use—and these should boost the current $22 million/year level of pool specialties sales substantially.

This week, for example, an eastern "estate builder" is sinking the first of more than 150 pools that are to be a part of his development; he'll put in six per week for as long as the construction season lasts. And one major pool installer reports that sales this year are running 120-160% above sales of the same period last year. This points to a clear increase in pool-care paints and specialties—which is borne out by *CW*'s spot check which shows pool specialties sales up 20-40% so far this year.

Public vs. Private: The greatly increasing number of home swimming units may somewhat shift the market for swimming specialties. Last year, in addition to the $22 million spent for such products as chlorine compounds, germicides, algaecides, fungicides and cleaning compounds, $9 million was spent for paints. But, although there are three times as many home pools as public ones, the public units required $14 million of the $22 million specialties total, $5.6 million of the paint total.

Still, the residential pools, not the municipal pools, are increasing in number most rapidly, and makers of pool chemicals are turning to private pool owners for their sales growth. At least 36,000 of the 53,000 permanent pools sunk this year will be residential ones. There are now upwards of 100,000 private pools in the U.S., compared with only 2,500 ten years ago, a 40-fold increase in the last decade.

In the Midwest, the number of private swimming pools has increased

*According to Robert M. Hoffman, publisher of *Swimming Pool Age*.

300% since '56, and the East shows gains almost as high. International Swimming Pool Corp. (White Plains, N.Y.), maker of Esther Williams private pools, pegs its sales for '58 at $10-million—up $6-million over '57's $4-million.

There are two big reasons why pools are enjoying such brisk sales: One, America's number one "status" symbol is no longer the automobile, it is the home, as it was 50 years ago. Secondly, it's much easier to finance a pool now. Last year almost two-thirds of all home units were purchased on the installment plan and the percentage should be even higher this year. According to International Pools, the day seems near when it will be possible to get an FHA loan toward purchase of a pool as a legitimate home improvement.

Few Brand Names: Because the mass marketing of residential pools is a new development, not much uniformity in the way chemical companies sell pool products has been developed. Distribution is a hodgepodge and prices aren't yet well-standardized. Chemical companies haven't put emphasis on mass media advertising and tradenames mean little or nothing to most owners of private swimming pools.

The swimming pool industry has yet to see an aggressive manufacturer of pool chemicals break into the field and establish uniform prices, markups, and distribution channels. There are hundreds of small local companies that formulate and/or package algaecides, germicides, fungicides and other pool chemicals. A few of these local companies, making as much as 600% profit on a single item, aren't interested in pool chemicals as a long term business, but only a new way to make money quickly. Increased competition, however, from legitimate companies and a more sophisticated buying public are slowly forcing the fast-buck operator out.

Old Standbys: The chemicals used in swimming pools haven't changed much in the last 25 years. Basic swimming pool chemicals are chlorine solutions or hydrochloric acid, used with soda ash to maintain the acid-alkaline balance. Two types of chlorine compounds are used to keep down the bacteria and algae content of water —calcium hypochlorite and sodium hypochlorite. Chlorine gas, used ex-

tensively in public and semipublic pools, is almost never used in private pools. Apart from these, there are algaecides and fungicides which have as their bases quaternary ammonium compounds, halogenated quinones or copper sulfate. About 10% of all germicides (most of these are chlorine compounds) and algaecides sold are used as athlete's foot preventatives.

Who's Who: Calcium hypochlorite, offered in both granular and tablet form, is probably the chemical most used by private pool owners. According to Olin Mathieson Chemical Corp. (Industrial Chemical Division), the largest supplier of calcium hypochlorite for this use, at least $3-million/-year worth of this chemical is purchased by pool owners.

Aside from Olin, the only other large basic manufacturers of calcium hypochlorite for pools: Pennsalt Chemical Corp. (Philadelphia) and Columbia-Southern Chemical Corp. (Pittsburgh).

It's difficult to rate the leading suppliers of hypochlorite and algaecides for pool use. Hundreds of local companies formulate these chemicals; all get a small slice of the market. Among the principal producers can be listed Purex Corp. Ltd., and John Jones Wiley Co. (both Los Angeles); Alexander Chemical Corp. (Chicago) and Solvay Process, Division of Allied Chemical. Algaecides and pool-cleaning compounds (special syndets) are made by hundreds of private label houses for practically every swimming pool supply company in the business. Inertol Co.'s, Inc. (Newark) Exalgae, and Creative Chemical Co.'s. (Pittsburgh) Aquatone, rate high in algaecide sales volume.

Distributors in Demand: Except in California, where backyard pools have been commonplace for a number of years,† there are few retail outlets where pool owners can buy chemicals. For example, in some communities it's not unusual for a pool owner to buy chlorine from a laundry jobber. The jobber simply fills his truck with liquid chlorine and services backyard pools. In other locations, pool owners are forced to order chemicals from a swimming pool supply house 500 miles

†Southern California alone now has about 45,000 private pools of which 35,000 are in the Los Angeles area. At the end of '58 Southern California will have about 65,000 pools, if building continues at its present rate. California pool builders feel the industry is in its infancy, that the 100,000 mark will be reached by the end of '61.

away. In a few places, pool owners can buy chemicals in garden supply houses, hardware stores, lumber yards, toy shops, drug and department stores and supermarkets.

The vast majority of chemicals for home pools, however, are bought through the nation's 3,100 swimming pool supply houses. These supply houses include pool builders (there are about 2,200 pool builders in the U.S.), equipment dealers, distributors and maintenance companies. At least 95% of these pool supply houses handle chemicals for pools. Municipal pool owners, on the other hand, buy their products from chemical supply houses. Over 80% of chemical purchases by municipal pools are bought through chemical, not swimming pool, distributors.

This year there's been a trend to move swimming pool chemicals into retail outlets. Olin Mathieson started selling its HTH brand calcium hypochlorite in hardware and garden supply houses this spring. Columbia-Southern also began retail sales. It's now test marketing its Pittabs and Pittchlor (both calcium hypochlorite products) in drug, department and hardware stores, supermarkets and garden supply houses. Retail sales have "been better than expected" but companies still have a big educational and promotional program ahead of them before these products can really begin to move.

There's also this problem to contend with: although the private pool business is growing fast, these pools are still few and far apart. It's hard to get a drug store or supermarket operator to clear off his already crowded shelves for a pool chemical.

It's likely to be some time yet before chemical companies offering pool products set up such good distribution channels that any pool owner can pick up his month's supply of products in the local grocery or drug store. Now, practically all pool owners buy chemicals in small quantities and depend upon the local jobber for quick delivery or upon the mailman for dependable service.

There are two reasons why pool owners buy in small quantities: limited storage of space—and money. Pool chemicals are usually packaged in 5-lb. bags, 100-lb. drums, 1-5-gallon jugs. Pool owners don't have enough storage space to warrant buying a sea-

son's chemicals. Further, since families buying the most pools these days are in the $8-$15,000/year income range, they prefer small-lot buying.

Swimmer's Budget: Although the amount paid for a pool-chemical varies greatly with locality, averages run something like this: calcium hypochlorite (70% available chlorine), granular form, costs 80¢/lb., tablet form, $1.00/lb. Liquid sodium hypochlorite (15% solution) sells for 70¢—$1.50/gal. Algaecides, containing quaternary ammonium compounds (10% active ingredients), retail for $4.00/lb. in dry form, or $5.00/gal. in liquid form. Algaecides based on copper sulfate sell for $4.00/lb., hydrochloric acid $1.50/gal., soda ash $6.00/100-lbs. Filter aids such as alum sell for $12.50/100-lbs., aluminum sulfate, $10.00/100-lbs.

Cost of chemicals for maintaining a backyard pool averages about $10 monthly during the swimming season. About half of the pools in the U.S. have a 12-week season, the rest a 40-week season.

Getting Their Feet Wet: Biggest development in the pool additive business in recent years is the startup of a number of companies offering chlorine or quaternary ammonium products for the nation's 15-million small wading pools. But most of these companies have met with a notable lack of success. They offer premium priced, small packaged items (ranging in size from 4-oz. to 16-oz.) and are sold exclusively through retail outlets. So far, however, they've had a tough job convincing the public that a sanitation chemical is needed in a pool holding 100-gallons of water. When they do, there may be a big market for wading pool chemicals. Companies now marketing chemicals for wading pools are: Pennsalt (Kiddies); Living Products, Inc. (New York) (Puro-Pool); P. D. Sales Co. (New York) (Pool Aid-18); and Garde Drug Co. (Philadelphia) (Pool Garde).

Obviously, with wading and permanent pools being sold at such a fast clip, there's going to be some confused—and dishonest—marketing of pool specialties. But the public is becoming increasingly aware of the kind of products it needs and the legitimate specialty maker, by approaching it imaginatively—and with patience—could find this field a richly rewarding one.

Using Salt Efficiently

by INTERNATIONAL SALT COMPANY, INC.

"Lixator" Improvements Make Brine Production More Efficient

Widely used throughout industry, Lixators are automatic rock-salt dissolvers developed exclusively by International Salt Company. They produce high-quality, fully saturated, self-filtered brine . . . and virtually eliminate the work and expense of storing, handling and using dry salt.

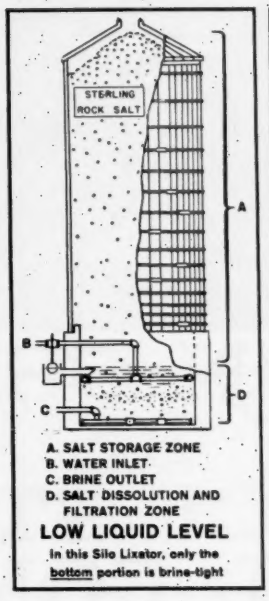
Excellent as this brine-making equipment is, International is constantly working to *improve* Lixator designs. From time to time, we also introduce special new Lixator attachments. Here are some improvements and attachments that can make production of Lixate brine more efficient and economical in your plant.

Low liquid level—a basic design feature that provides great savings by eliminating the need for deep salt-dissolving tanks. For example, it is possible to convert an old silo, dry-salt storage bin or unused room into a first-rate Storage or Silo Lixator simply by making the lowest portion into a waterproof salt-dissolving and brine-storage tank. The upper portion need *not* be waterproofed or made brine-tight.

A common method of waterproofing is to line the floor and bottom portion of the walls with concrete. Lixate brine is made in this lower tank portion, with dry salt occupying the space above the liquid level.

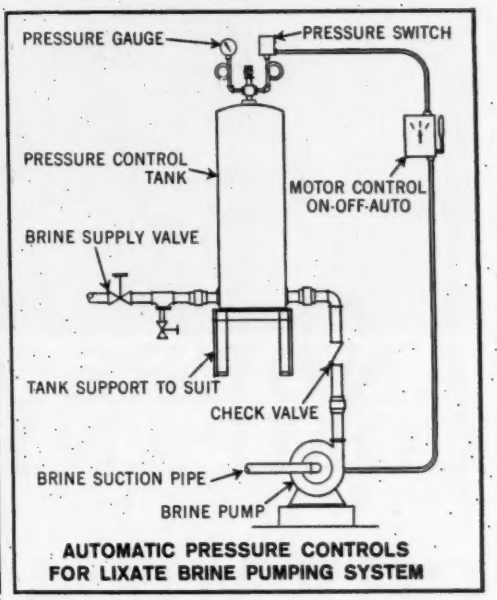
Electrode controls. To regulate the liquid level in a Lixator, electrode controls are often used. This is an excellent alternative to the standard float controls in many Lixator installations.

Two electrodes of different length are protected in a length of pipe, then immersed in the Lixator. Whenever the liquid level falls below the lower electrode, the electric circuit is broken, a relay opens to close a load contact, and the water valve is opened. When the liquid level rises to the higher electrode, the circuit is closed, and the relay closes to shut the valve. In this way the brine level is maintained between the desired limits in the Lixator—continuously and automatically.



LOW LIQUID LEVEL

In this Silo Lixator, only the bottom portion is brine-tight



AUTOMATIC PRESSURE CONTROLS FOR LIXATE BRINE PUMPING SYSTEM

Pressure controls . . . for brine systems. International has introduced the technique of automatically starting and stopping Lixate brine pumps by pressure switches. If a valve is opened anywhere in the brine distribution piping, brine flows and brine line pressure drops slightly. This, in turn, activates a switch, starting the pump, which withdraws brine from the Lixator. Everything is automatic. The operator only opens and closes a brine valve at the point of use.

Introduction of brine-metering devices. In cooperation with leading meter manufacturers, International has pioneered in the application of highly accurate and specialized meters for brine. Among the advantages of using these meters with Lixators is precise *salt* measurement, since every gallon of Lixate brine contains exactly 2.65 lbs. of salt. Also, automatic shut-off metering devices allow you to preset the amount of brine you want. Flow will stop when this amount has been measured out.

In many other ways, brine meters and other Lixator attachments can boost brine-making and brine-using efficiency. To find out how you can benefit from such devices, contact International. One of our experienced sales engineers will gladly explain about brine-density and brine-flow regulators, piping layouts, continuous brine-dilution devices, etc. He can also recommend the type and size of Sterling Salt best suited to your needs.

INTERNATIONAL SALT CO., SCRANTON, PA.

Sales Offices: Atlanta, Ga.; Chicago, Ill.; New Orleans, La.; Baltimore, Md.; Boston, Mass.; Detroit, Mich.; St. Louis, Mo.; Newark, N. J.; Buffalo, N. Y.; New York, N. Y.; Cincinnati, O.; Cleveland, O.; Philadelphia, Pa.; Pittsburgh, Pa.; Memphis, Tenn.; and Richmond, Va.

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For catalog, Product Data Bulletins or detailed information on quantities, packaging and prices write Stauffer Chemical Company (see below) or Anderson Chemical Company, Weston, Mich.

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QUINOLINE: 4, 7-DICHLORO **VANADIUM:** OXYTRICHLORIDE
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Technology Newsletter

CHEMICAL WEEK
July 19, 1958

Celanese is introducing a new polyolefin resin family, Fortiflex B. They are linear polyolefins but have a few short branches along the main chain. The short chains keep the molecule from "slipping" and the resultant product, says Celanese, shows marked improvement in resistance to loading and stress, without loss of the desirable properties of a linear product.

Du Pont, in a classic piece of research, developed a correlation between short-chain branching and the mechanical and physical properties of polyethylene (*CW, Feb. 6, '54, p. 44*). Celanese says, however, that its latest work must be considered separate from Du Pont's research; the Celanese research deals with a linear polyethylene, whereas Du Pont was concerned, for the most part, with a nonlinear product.

The first commercial member of the family is designed for monofilaments. Others will be in production by next month.

Celanese is not talking about exact composition of the resin or its method of making it. Obviously, however, it's a copolymer composed mostly of ethylene. The other component (not propylene) may be butylene.

•

Cheaper titanium valves and fittings are in the offing. That's what Stephen Shelton, general manager of Oregon Metallurgical Corp. (Albany, Ore.), says. Shelton points to recently improved casting techniques developed by his firm, concludes that within a year, the prices of titanium valve bodies should be approximately 50% more than that of comparable stainless units. (They now cost about twice as much.)

Shelton also tells of a decided pick-up of interest on the part of chemical firms in titanium equipment, citing lower price and increased availability as reasons. Oregon Metallurgical casts valve bodies, doesn't assemble the valves. It's currently working on titanium valve bodies for Freeport Sulphur's new nickel-processing plants at Moa Bay, Cuba, and Louisiana.

•

Polycarbonates are stirring up interest in Japan. Teikoku Rayon reportedly will start test production of the resin. Plans call for output of 1 ton/day by the end of this year, eventual expansion to 5 tons/day.

Bayer is stepping up its production, too. Now making 1 ton/month, it's building a 100-150-tons/month plant at Uerdingen.

•

Kanamycin (CW Technology Newsletter, April 5) has proved effective against staphylococcus and other bacteria that readily develop resistance to other antibiotics, according to clinical test results disclosed last week. Reports also indicated that the antibiotic produces only slight side reactions. Bristol Laboratories, Inc. (Syracuse, N.Y.), produces kanamycin under the tradename Kantrex, released it for use last month.

A $300,000 calcination system for radioactive waste disposal will be used at the National Reactor Testing Station (Arco, Idaho) to treat highly contaminated liquids produced by spent-fuel recovery operations. Fluor Corp., Ltd. (Los Angeles) has been studying the feasibility of such a system since February, last week got the go-ahead from AEC to start detailed engineering work.

Developed jointly by AEC, Fluor and Phillips Petroleum Co., the calcination process concentrates the liquid wastes into a dry material that can be stored easily—and relatively cheaply—in stainless-steel-lined underground vaults.

•

A new way of producing aromatic polycarboxylic acids from nitriles or amides has been patented in Germany (preliminary patent DAS 1,027,656) by Henkel & Cie. GmbH. (Dusseldorf-Holthausen). The process is said to permit several carboxyl groups to be introduced into any aromatic cyclic or heterocyclic molecule, even if other substituents are present and if the derivative is stable above 250 C.

Carboxylation is carried out in the presence of a metal catalyst (zinc, cadmium, mercury, iron, lead or their derivatives) at pressures of 5 to 500 atmospheres. Product: a salt of the polycarboxylic acid. Potassium carbonate is a preferred reactant, supplies the alkali as well as the carbon dioxide required. Some typical products: terephthalic acid from benzonitrile; 2,6-naphthalenedicarboxylic acid from alpha or beta-napthoic nitrile; beta-gamma-pyridinedicarboxylic acid from beta-cyanopyridine. Yields reportedly run 60-70%.

Henkel also developed the terephthalic acid process piloted in the U.S. by Hercules (*CW, April 6, p. 32*).

•

Moving sulfur by pipeline is getting special study in Canada in connection with the $80-million gas pipeline there (*see p. 19*). The work is being done in Edmonton under the direction of D. W. Govier, of the University of Alberta. No details are forthcoming, but speculation is that the sulfur will be piped in a suspension in oil and water.

•

A new plastic designed for use in missiles and rockets is offered by Reichhold Chemicals (White Plains, N.Y.). Laminated parts made from the material will reportedly withstand up to 4500 F for brief periods, up to 500 F for 100 hours and longer. A phenolic, called Plyophen 5900, it also features low moisture absorption, good resistance to organic solvents.

•

Nematodes can take much more radiation than was expected, U.S. Dept. of Agriculture researchers reveal. There's no prospect now of using radiation to kill the tiny, wormlike pests on living plants. Lethal dose for some kinds of nematodes is 350,000 to 640,000 roentgens—which would injure plants.

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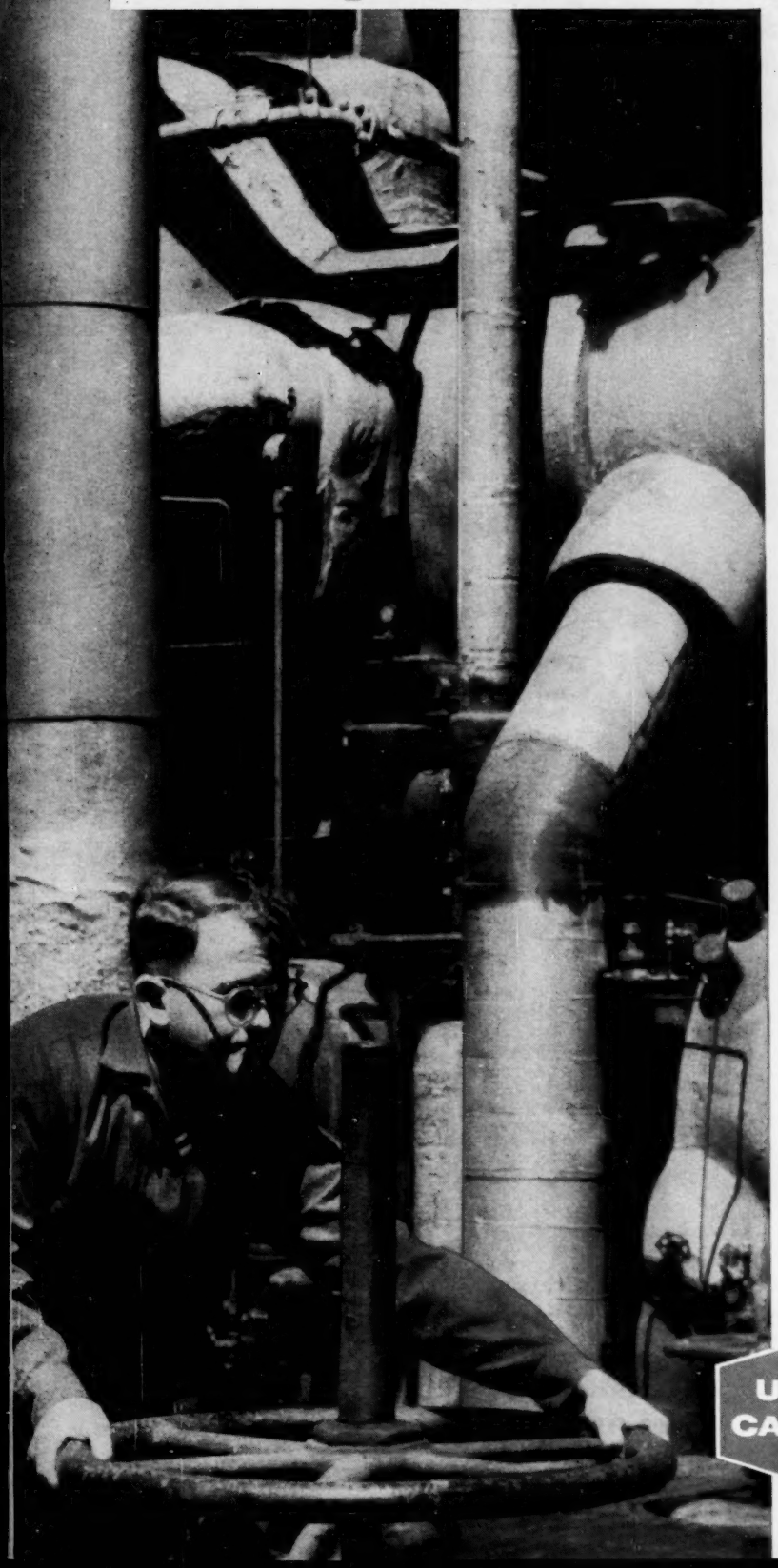

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For information on applications and specifications for Methyl Isobutyl Ketone and 14 other ketone solvents, write for the booklet, "Ketones." For aid in selecting the proper solvent to strike the best balance between cost and performance in your formulations, send for the handy 6-page booklet "Solvent Selector"; it gives complete data on 70 solvents. Write . . . Department H, Union Carbide Chemicals Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, New York.

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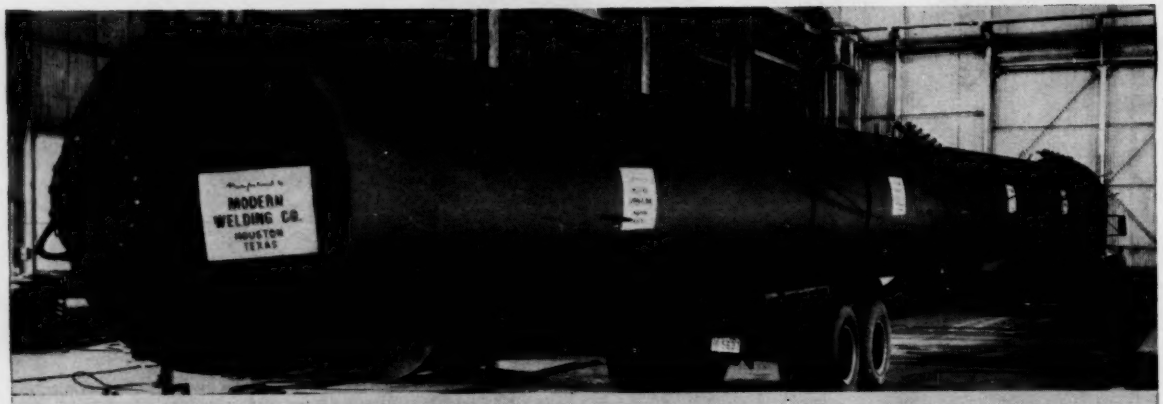
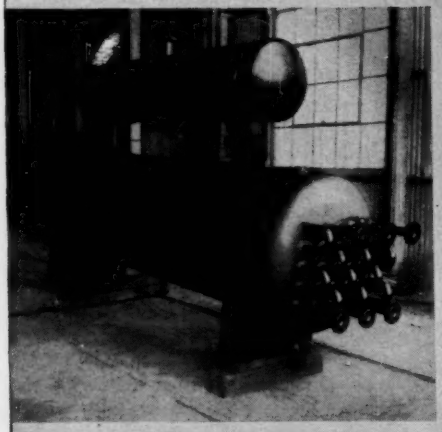
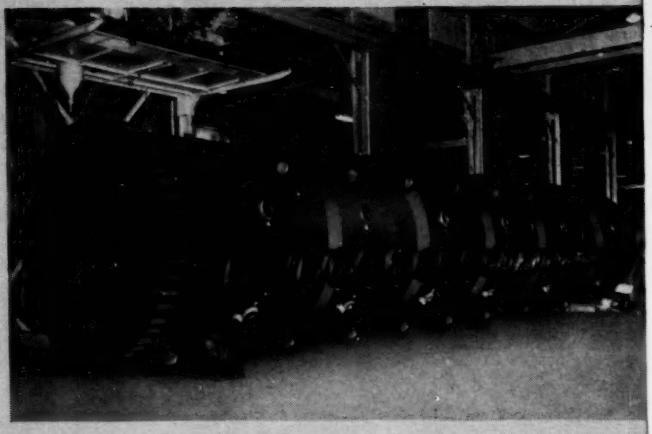


Fractionating Column—72" Dia. X 110'-0" length, ¾" wall thickness with 40 trays. All welds 100% X-ray quality. Constructed for internal pressure and full vacuum. Stamped A.S.M.E. Code. Total weight 83,000 lbs.



Heat Exchanger — Lower Section 4'-0" dia. X 14'-0". Upper Section 1'-8" dia. X 10'-0", ⅝" Carbon Steel Plate Wall. A.S.M.E. Code construction using tube bundle of schedule 160 pipe.



Styrene Stripping Column—9'-6" Dia. X 80'-0" length, ½" plate walls and ⅝" heads. Constructed and stamped A.S.M.E. Code. Vessel contains 14 stainless steel perforated trays, 16 manways, 146 couplings, and nozzles. Total weight 72,000 lbs.

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Pittsburgh Corning's sales manager Layton wields torch, Foamsil keeps production's Gilully cool.

Foamed Silica Bows as Equipment Liner

After dunking their new Foamsil insulating and refractory material in acids and punishing it with a 6300 F flame for members of the press (above), Pittsburgh Corning Corp.'s sales and production representatives went back to their less spectacular, routine tasks this week. But judging from the demonstrated properties of the product, the company will hear more from potential CPI customers.

Claims of nonporosity to acids, light weight and unequalled (—450 to 2200 F) temperature resistance (*CW Technology Newsletter, July 12, p. 70*), make Foamsil potentially attractive to all firms with acid-handling problems. In fact, Jim Layton, refractory sales manager, looks for Foamsil to challenge for a leading spot in the acid-brick market. But Pittsburgh Corning's big problem right now is that the material is so new, there's no telling exactly where it is going to fit in.

That PC had been developing Foamsil, a 99%-pure fused silica, was no secret to many companies for a long time—PC had worked on it for about nine years. But samples for test purposes were few and far between. Only now, process bugs having been worked out and a specially designed continuous horizontal electric furnace put into production, is sufficient Foamsil available for fully trying out the potential of the material.

Boiled, Foamed and Sealed: The physical characteristics of the fused silica—a light-weight foam with noninterconnected bubbles—are obtained by boiling at over 3100 F with a carbon foaming agent in the electric furnace. When cooled, a rigid, nonabsorbent, sealed silica-cell structure results.

Because its sealed silica cells prevent absorption of any concentration of hot acids or inflammable solvents and vapors, Foamsil is recommended as a lining for tanks, pipelines, towers. Its thermal conductivity is low. In 95% sulfuric acid service at 480 F, 4-in.-thick Foamsil has replaced 19-in.-

thick acid brick. And at 250 F, 1-in.-thick Foamsil is said to be equivalent to 18-in.-thick acid brick in insulating value.

This insulating advantage allows lining thicknesses to be cut, capacities of existing vessels and pipes to be increased. And, because Foamsil's density is only 10 to 15 lbs./cu. ft. compared to about 140 lbs./cu. ft for acid brick and about 97 lbs./cu. ft. for carbon black, some of the supporting and reinforcing structure can be eliminated.

Foamsil has good dimensional stability, doesn't warp, shrink, slump, crack or spall during rapid temperature changes. Its low expansion coefficient gives it volume stability throughout its temperature range, reduces the need for expansion joints and vertical clearances. And it has a compressive strength of 130-210 lbs./-sq.in., a flexural strength of 120-150 lbs./sq.in. and can be used as a load-bearing surface. (Layton says a non-supported Foamsil stack could be erected to a height of 2,800 ft.)

And, in some cases, Foamsil can be used where austenitic stainless steel fails due to stress corrosion. However, on a strength basis alone, Foamsil can't compare to acid or carbon bricks—they have 20 to 30 times its strength properties. Also, where abrasion is a problem, Foamsil should be protected. Foamsil floorings, or pickling tanks, for example, would not be practical. On the other hand, Foamsil has a smooth crust of fused silica on its surface when removed from the electric furnace, and this surface may be of value in stack linings where abrasion is a problem.

Temperature Advantages: Foamsil's 2200 F temperature limit is matched by acid brick, while 660 F is the top temperature for carbon brick in oxidizing atmospheres. However, Foamsil's advantage is in thermal-shock resistance—it will withstand cyclic temperatures of —450 to 1600 F. Acid brick's thermal-shock resistance is low.

Foamsil has been held at 1600 F for a period of more than two years without evidence of deterioration. But in hot-acid service there may be some high-temperature problems, since at 1850 F the brick devitrifies, loses its "glassiness," and may possibly become porous, vulnerable to acids, or structurally weak. However, this possible shortcoming is based on theory. It has yet to be tested.

Not All-Purpose: Foamsil is not an all-purpose chemical lining material, however. It cannot be used in hydrofluoric acid, hot-phosphoric-acid and alkali service as can acid brick and carbon brick — so-called "chemical bricks." Harbison-Walker's Duro (silica-alumina) brick, for example, will withstand all acids except hydrofluoric and also will withstand alkalis in varying degrees. And National Carbon's carbon brick will withstand acids, including hydrofluoric, and alkalis.

Although Foamsil is nonporous, it may be difficult to take full advantage of this property, since it must be joined with the porous cements available. Very low porosity has been achieved in some other bricks—"impervious" carbon brick has a 2% porosity; impervious graphite, 0.7%; H-W's regular Duro brick, 4-7%; "L", 1-4%. Standard carbon brick has about 23% porosity. In any case, where porosity is a problem, it will likely be necessary to use lead, rubber or resin lining, and steel shells—conventional acid-type construction.

In price, Foamsil, at 50¢ per board ft. has an advantage over carbon brick at $0.70-$1.00/brick (about 0.7 board ft.), but is at a disadvantage with acid brick at about 10-12¢/-brick. However, cost is dependent on many other factors. For example, extra thicknesses of acid brick will add to installation cost. And, Foamsil can be cut easily into many different shapes, comes in 17-in. lengths compared to standard 9-in. brick sizes, which can be added advantages.

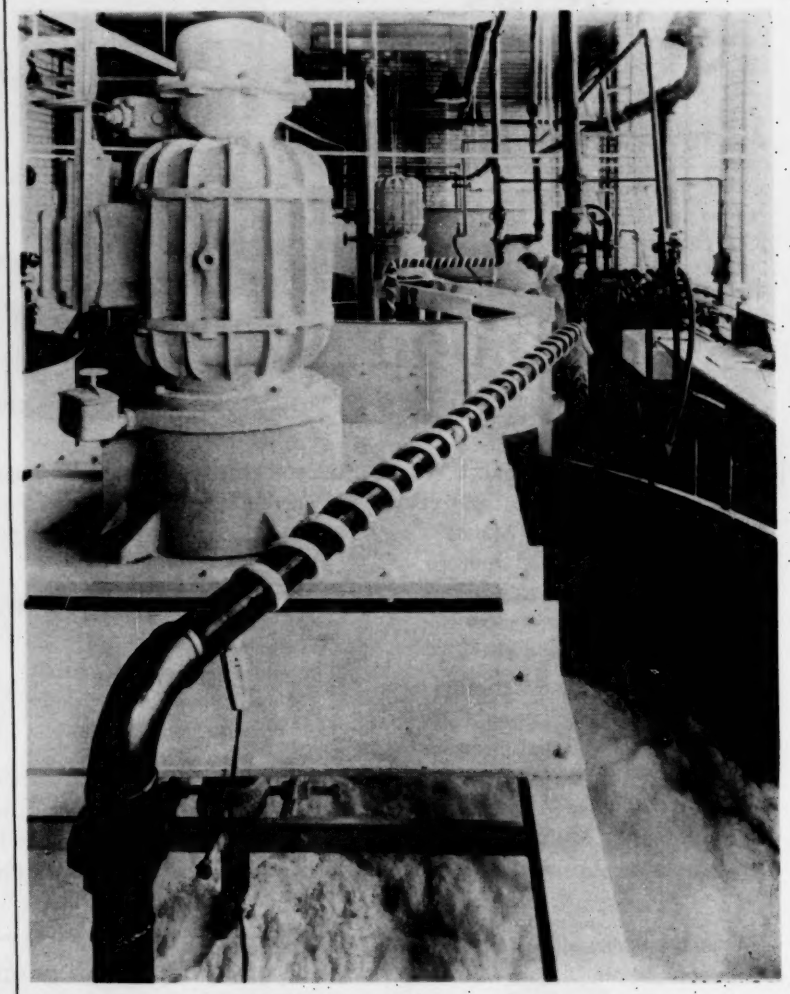
Insulation: Cost-comparison problems carry over into Foamsil's use for strictly insulating purposes, too. While Pittsburgh Corning admits that it cannot hope to compete with insulation blocks like diatomaceous earth and lime and magnesium silicates at 25-30¢/board ft., in the cases where these insulating materials fail because of moisture, oil, etc., Foamsil's special absorption-resistant properties may win jobs for it.

Chemical firms can't expect Foamsil to be a cure-all. But its appearance on the market in production quantities adds new temperature and structural versatility to acid-lining, insulating and refractory materials for process equipment.

EQUIPMENT

Drives and Couplings: Dodge Mfg. Corp. (Mishawaka, Ind.) has added three large and one small unit to its line of Flexidyne "dry fluid" drives and couplings. The new large units come in diameters of 18 in. (drive or coupling rated at up to 200 hp. at 1,200 rpm.); 22 in. (coupling rated at up to 800 hp. at 1,200 rpm.); and 27 in. (coupling rated at up to 1,000 hp. at 900 rpm.). The new small unit measures 6 in. in diameter, will deliver up to 2 hp. at 1,800 rpm.

Plastic Pipe: An improved Kralastic resin developed by U. S. Rubber Co. makes possible a new rigid plastic pipe that can be used at higher operating pressures and temperatures than any other thermoplastic pipe, according to its maker, Carlon Products Corp. (10225 Meech Ave., Cleveland 5). The new HTHT pipe can be used at temperatures up to 180 F. The ½- in. through 6-in. sizes will withstand working pressures of 100, 125, 150 and 200 psi. Schedule 80 IPS pipe is available for working pressures up to 500 psi.



Knitted Sleeve for Heating Ease

This British chemical company has solved the problem of temporarily heating a fluid transfer line by wrapping resistance wiring, encased in a knitted-elastic sleeve of glass fiber yarn, around the pipe. Pipe is unwrapped after the reactor contents have been transferred. The electric-resistance sleeve is supplied by Electro-Thermal Engineering (London).

HOW J&L PIGMENTED PHENOLIC LININGS

"Eliminate product spoilage for Niagara Chemical"

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Market Newsletter

CHEMICAL WEEK
July 19, 1958

The aromatics market is boiling over this week. And benzene-toluene-xylene observers say it'll be a long time before conditions simmer down again. Slashed prices, cut-throat competition, bloated capacity and some sharp maneuvering for customers are some of the reasons behind the situation.

Take benzene, for example. Prices have been cut 5¢/gal. in a mass but reluctant industry retreat from the stubbornly held 36¢ tag that's been in effect for more than three and one-half years. Biggest surprise, next to the drop itself: the move was initiated by a major petro-benzene maker. (Producers of petroleum-derived benzene have been most voluble in denouncing as "utter folly" any price-cut talk [*CW Market Newsletters, Dec. 28, '57; April 26*].) Ostensibly, the Texas oil firm reduced prices to combat the increasing flood of low-cost Russian material pouring into the U.S.

Although forced to follow suit, competitors also insist that the lower price won't help boost consumption since consumers are already taking all the benzene they can use.

The price slice, however, may deter some potential petrobenzene makers from swinging into production and adding to the U.S. oversupply; it may also block contract-signing for delivery of more foreign material next year—if the U.S. price stays at the low 31¢ level.

There's some talk that toluene prices may dive again, but major marketers ridicule the idea. Last toluene cut came about three months ago (*CW Market Newsletter, April 19*) because of lagging demand, climbing stocks, and rough competition from solvent substitutes and blended materials.

Domestic demand has continued its downtrend, but producers point out that the current price of 25¢/gal. (east of the Rockies generally) is "economically unsound," considering manufacturing and shipping costs, and no maker could afford to chop prices further. If any change occurs, says one, it will be a hike—and probably will come before the end of the year.

On the other hand, xylene tags will likely be cut, marketers say. The reductions—possibly as much as 5¢/gal., though a 2¢ or 3¢ cut is more likely—may come within a week or so. Xylene sellers have also been plagued by increased customer preference for lower-cost substitute solvents. The anticipated xylene cut may lead off some of the growing competition.

A couple of typical current prices on xylene: around Philadelphia, 33¢/gal.; Baytown, Tex., 31¼¢/gal.

U.S. dicyandiamide users have a new source of supply—imports. An important melamine ingredient, the material comes from British Oxygen Chemicals, is manufactured in Norway by associate company Odda Smelteverk A/S. It's being handled in this country by Philipp Brothers Chemicals (New York).

The latter is pushing its "dicy" as "available for immediate delivery at all times . . . from warehouse stocks, at attractive prices." The foreign material sells for 1¢/lb. under the 20¢-c.l. and 21¢-l.c.l. schedules posted by sole U.S. producer American Cyanamid. The latter isn't too concerned about the newcomer's tag, insists Cyanamid's servicing of customers more than compensates for the penny differential.

•

Quotes are changed this week on a couple of old-line insecticides: DDT is up, benzene hexachloride (BHC) is down. The DDT increase (1¢/lb.) applies to export prices, was posted by Olin Mathieson's Chemicals International Division. Market for the technical-grade material has tightened because of substantial overseas shipments earlier in the year, and a decided improvement in domestic buying over the past few weeks. That may explain these higher powder and flake prices: 23¢/lb. for powder, 22¢/lb. for coarse-grind material. Orders for less than truckload quantities (23,000 lbs.), says OM, sell at "the usual 1¢/lb. premium."

The price drop on high- and low-gamma BHC amounts to 0.075¢/lb. gamma unit, re-establishes the 0.75¢/unit industry tag in effect prior to second-quarter postings (*CW Market Newsletter, March 8*). Frontier Chemical's customer notification notes its new price is f.o.b. Wichita, Kan., "with minimum rail freight allowed on full truckload and carload lots to any destination in continental U.S."

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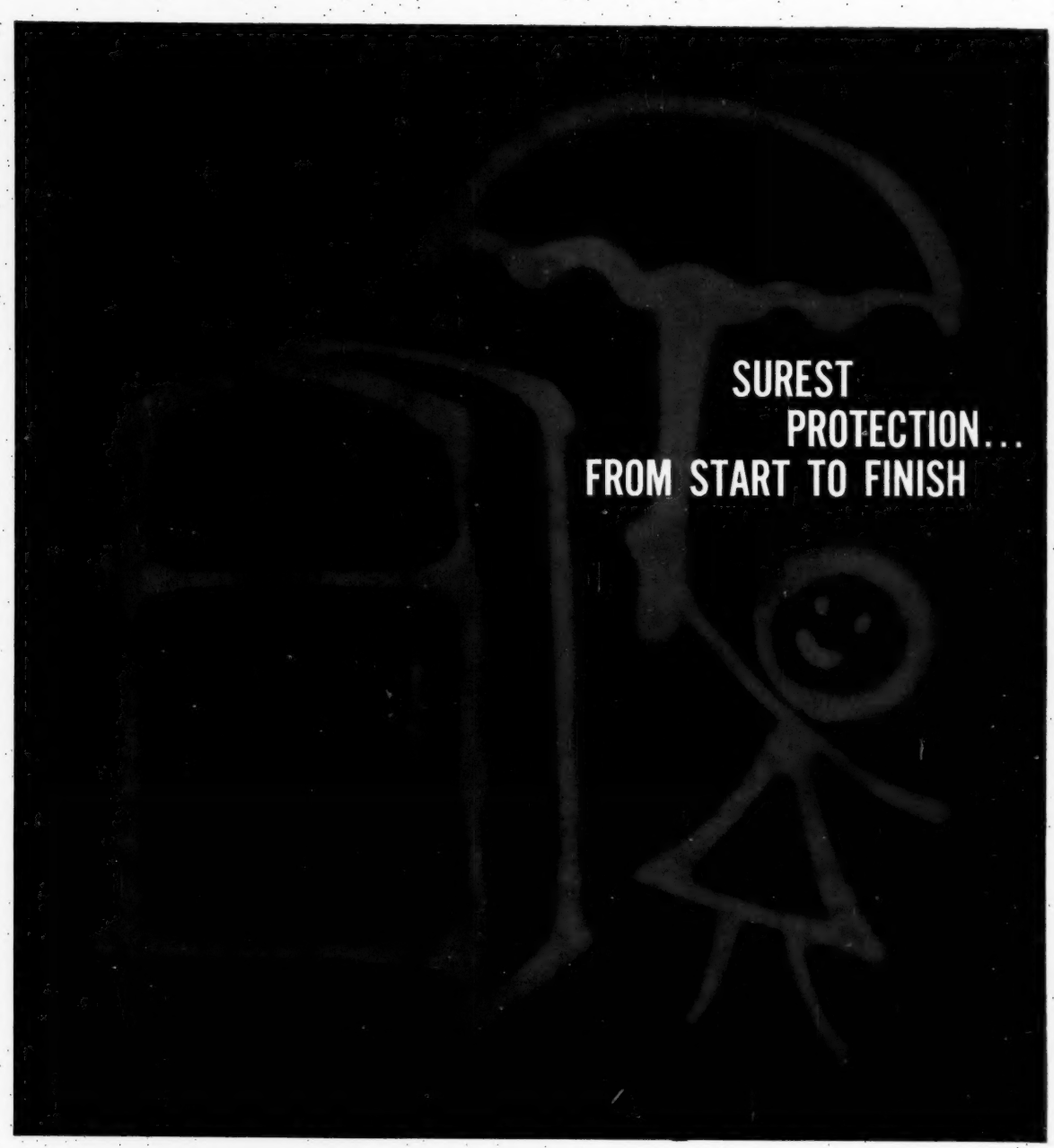
A significant switching in fertilizer output plans is under way for Central Farmers Fertilizer Co.'s abuilding $16-million Georgetown, Idaho, facility. Triple superphosphate "of higher than average strength" will be made instead of calcium metaphosphate. Reason: members of Western Fertilizer Assn. in the Intermountain Pacific Northwest states are joining in the CFC project, and—because of the alkalinity of arid Western soils—they need a product that is more water-soluble than cal-meta. (CFC is owned by 14 of the largest Midwestern farm organizations.)

The new plant is half finished, will have a 35,000-kw. elemental phosphorus furnace in operation by the first of the year. Mining of necessary acidulation-grade phosphate rock begins at Georgetown late next month.

Calcium metaphosphate production isn't being overlooked, however, despite the change in products. Says a spokesman: Cal-meta will be produced when a second furnace, now planned, is completed at the Georgetown location.



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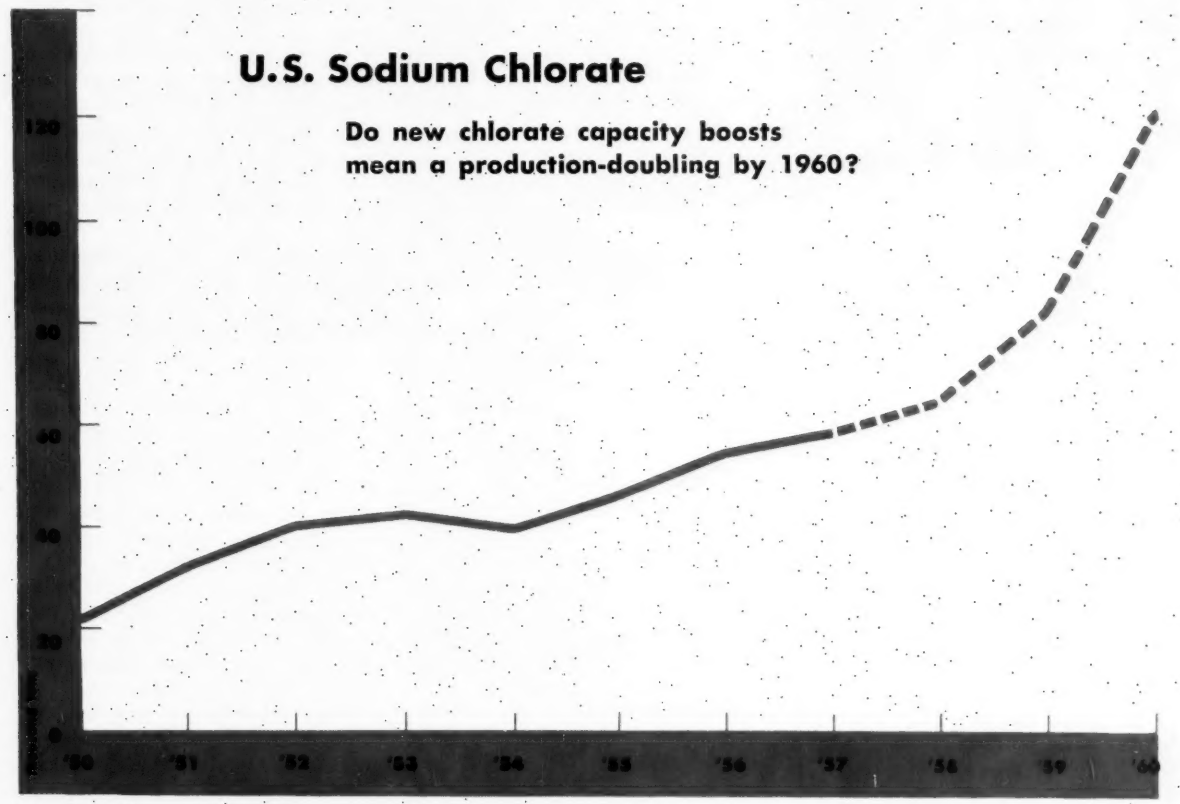

Power, Paper: Future Props for Chlorates

U.S. sodium chlorate capacity will climb well over the 100,000 tons/year mark by early '59 when several new plants and expansions will be ready to go onstream. The current expansion rush creates this poser for market followers: will demand be high enough by 1960 to justify production of twice the 59,142 tons of chlorate produced last year?

The answer doesn't emerge easily because chlorate demand is tied primarily to two big outlets—one reasonably assured, the other potential. The assured market is the pulp and paper industry which is switching to use of chlorate-derived chlorine dioxide bleach. Although few trade observers are willing right now to attempt to pinpoint the ultimate demand in this use, all agree that it will be big — possibly the major use for sodium chlorate for a long time.

High-Energy Question: The other big market—still highly speculative—is in manufacture of ammonium and lithium perchlorates for use in rocket and missile propulsion. One estimate of potential ammonium perchlorate demand in this security-shrouded area is a "conservative" 50,000-100,000 tons/year by 1960-61. This forecast, now bandied about by trade observers, reportedly originates from top rocket makers.

Chlorate producers, generally, will neither confirm nor deny the estimate. Some say it's too early to predict realistically the ultimate high energy fuels market of perchlorates; others—perhaps somewhat boastfully parry queries about future demand by asking: "Why should we tip off the competition to a good thing."

Competition, say producers, should be heavily underscored. There's plenty of it. In addition, the business right now is basically a hazardous one and not for the timid.

The current rush to make ammonium and lithium perchlorates for rocket fuels is spurred largely by the belief that increasing emphasis is being put on development of solid propellents as opposed to liquid-fuel systems. But even if solid fuels do come to the fore, and perchlorates find an important place in their formulation, there's always the chance that a new discovery in fast-moving rocket technology could make today's best-bet fuels obsolete overnight.

And, of course, at this stage the pre-eminence of solid fuels isn't assured. The emphasis still placed, by some, on liquid fuels is illustrated by Wyandotte's activities with liquid monopropellants *(CW, July 5, p. 63)*. In any case, two factors point to substantial markets for perchlorates whatever the basic trend. The spectrum of missile and rocket designs will no doubt require the use of many types of fuels; too, some industry spokesmen hint that perchlorates may also

be useful in formulation of liquid as well as solid propellents. And, of course, should the rocket market turn out to be something less-than-hoped-for, chlorate production can be channeled into other growing markets—notably pulp and paper bleaching.

Who's Top Producer? Right now the industry's market researchers are trying to decide who is the nation's top producer of chlorate. It's generally recognized that the distinction goes to either American Potash & Chemical Corp. or to Hooker Chemical.

AP&CC has a 28,000 tons/year sodium chlorate unit at Henderson, Nev., which produces several chlorates and perchlorates. About half the sodium chlorate production is made into sodium perchlorate and then into ammonium perchlorate. The firm's ammonium perchlorate capacity is about 18,000 tons/year.

AP&CC also has a new 18,000 tons/year sodium chlorate plant—now partly onstream—at Aberdeen, Miss. Some of the primary product will probably be used, in time, to make other chlorates and perchlorates.

And the manufacture of lithium perchlorate for rocket fuels should pose no difficulties for AP&CC because the firm already has a source of lithium through its subsidiary, American Lithium Chemicals.

Most of the guesswork has to do with the size of Hooker Chemical's chlorate operations—and Hooker, while claiming top billing as chlorate producer, is quite content to let the competition keep on guessing. About its Niagara Falls plant, the firm will say only that capacity is "considerable."

It's quite clear, in any case, that Hooker is going all-out for a leading position in the chlorate-perchlorate business. Hooker's acquisition of Oldbury Electrochemical—producer of many chlorates and perchlorates—provided a good start.

And last fortnight Hooker announced completion of a million dollar expansion, and authorization of a second equally large expansion by April '59, at its Columbus, Miss., chlorate plant. Including the forthcoming expansion, the $7 million installation will boost chlorate capacity "more than double" that of the initial 12,000 tons/year unit. To this Hooker spokesmen add only a cryptic reminder that 24,000 tons/year represents the absolute minimum, and actual capacity could be considerably more.

Much of Hooker's chlorate output will be channeled into the pulp and paper industry. But the firm's attempt to garner a lion's share of other important chlorate-perchlorate markets was underscored, earlier this year, by the formation of HEF, Inc.—a joint company with Foote Mineral. Foote's contribution to the production of lithium perchlorate is twofold: supplying of lithium and of technical know-how in propellent research.

Construction of HEF's plant is now under way (*CW Business Newsletter, July 5*); it's described as "a multi-million-lbs./year plant for production of ammonium perchlorate, an oxidizer used in solid propellents for rockets and missiles." The facility will be situated next to Hooker's chlorate plant at Columbus, Miss.

HEF "anticipates the possibility of large contracts for ammonium perchlorate" and states that the new facility can also produce lithium perchlorate "should a demand arise."

Other Producers: In the west, at Portland, Ore., Pennsalt makes sodium chlorate for (pulp and paper, uranium processing, pesticides) and potassium chlorate (for matches). And under construction at the same location is Pennsalt's ammonium perchlorate plant. Company spokesmen confirm trade rumors that the new installation now going up is "only pilot size."

Lithium Corp. of America has a lithium perchlorate pilot plant in Minneapolis, Minn., but there's no indication yet when the firm will go into commercial-scale production.

Meanwhile, trade observers wonder how Lithium Corp., which must buy chlorate to make the lithium compound, can compete against producers who "are basic" in both chlorate and lithium. The most obvious answer is merger with a chlorate producer. When queried on this point by *CW*, Lithium Corp. said, "It's not inconceivable that a joint effort might be made in this field"—the implication being that such a move, if it's forthcoming, is at least several months off, although "there should be some news before the end of this year."

Scratch One: Cardox Corp. (Claremore, Okla.) was formerly a small-volume producer of chlorates and perchlorates, using them to make ex-

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plosives. Manufacture of both chlorates and perchlorates, the firm reports, has been discontinued.

Several other chemical companies have been studying the chlorate-perchlorate business with interest, but there's no indication, yet, that any have decided to take the plunge.

Bleach Biggest: Use of sodium chlorate to make paper bleach chemicals will likely continue to grow significantly for several more years. Also growing is demand for chlorate in the manufacture of chemical intermediates—although rate of increase now appears to be slackening a little.

Several other chlorate uses (e.g. explosives, textile bleaching and dyes, metallurgy, defoliation, herbicides) will probably decline somewhat this year because of the business recession. Adverse growing-weather will likely cut demand for agricultural uses.

Chlorate exports, sales to dealers, and use in manufacture of matches will remain about the same in '58 as in recent years. Chemical processing requirements, however, may rack up a small increase.

How much sodium chlorate is converted to perchlorates used in compounding rocket fuels isn't clear, but substantial amounts of ammonium perchlorate are used, and prospects for lithium perchlorate are bright. Ammonium nitrate is actually the workhorse oxidizer, accounts for some 80% of total solid propellent weight; ammonium perchlorate imparts higher specific impulse.

Lithium perchlorate is a promising oxidizer because it has more available oxygen than does ammonium perchlorate; it does have certain drawbacks, however, that producers are trying to eliminate—e.g., high price, hygroscopicity, imcompatability with some other ingredients.

The over-all supply/demand picture could be altered drastically if firms that now "are watching the chlorate business closely" decide to take an active part in the business. It's one possibility that existing producers hope to discourage by pointing out that soon-available capacity will easily supply pulp and paper requirements.

But the appraising eyes on the sidelines are perhaps cast more in the direction of rocket propulsion; and rocket power—not paper—may well propel newcomers onto the chlorate horizon.

J. W. Shepherd comments on the current major interest in:

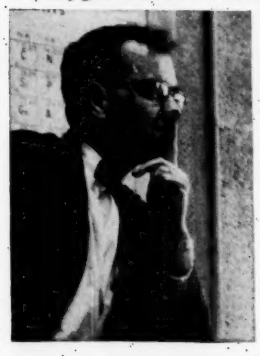
TRIMETHOXYBOROXINE $(CH_3O)_3B_3O_3$ and METHYL BORATE $(CH_3O)_3B$

"Trimethoxyboroxine is a colorless liquid, miscible with organic solvents, or useful alone for extinguishing metal fires. Methyl Borate is a non-aqueous solvent, azeotroping agent, Lewis-acid catalyst, and intermediate"

J. W. Shepherd, Ph.D., Purdue University
Coordinator, Commercial Research and Development
Callery Chemical Company

Q. Dr. Shepherd, what is the chemical relationship of these two compounds?

A. Trimethoxyboroxine is a chemical combination of Methyl Borate and Boric Oxide. The equimolar product exists predominantly as a cyclic trimer, with a six-membered ring of alternate boron and oxygen atoms. Variations in the combined boric oxide content alter the density and viscosity of the product.



Q. What are some uses for Trimethoxyboroxine and Methyl Borate?

A. Glycidyl ethers (epoxides) are both polymerized catalytically and cross-linked by Trimethoxyboroxine. Patents have been issued on the use of Methyl Borate as a catalyst for the condensation of ketenes with aldehydes and ketones to form β-lactones and also to increase yields of ketones from β-keto acids.

Q. How does "TMB"* extinguish metal fires?

A. When applied to burning magnesium, titanium, hafnium or zirconium, "TMB" burns and covers the metal with molten boric oxide that excludes air. Extinguishers filled with "TMB" are available.

Q. How stable is Trimethoxyboroxine?

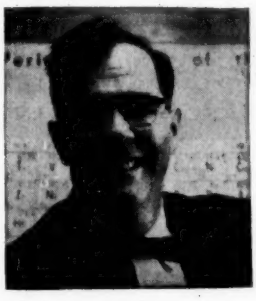
A. It is hydrolyzed by water to methanol and boric acid. When it is heated, the equilibrium pressure of Methyl Borate reaches one atmosphere at about 125°C.

Q. What's the basis for using Trimethoxyboroxine and Methyl Borate as welding fluxes?

A. They can be used wherever boric oxide is effective. Methyl Borate is used in the fuel line as a volatile welding flux; Trimethoxyboroxine can be dipped or painted onto the joint.

Q. How does Methyl Borate differ from Trimethoxyboroxine?

A. Methyl Borate is a more mobile liquid, has a lower boric oxide content, and is a weaker Lewis-acid. It has a lower boiling point than Trimethoxyboroxine.



Q. In what form is Methyl Borate most frequently used?

A. The azeotrope of Methyl Borate with methanol is more widely used than pure Methyl Borate. A new and promising use for the azeotrope is to clean corroded mild steel equipment. We have both pure Methyl Borate and its methanol azeotrope available for sale.

Q. What are some of the properties of Methyl Borate?

A. This compound is miscible with a variety of organic solvents. It is a solvent for various resins, waxes, hydrocarbons, paint compositions, and vulcanized rubber. Methyl Borate is readily hydrolyzed. It's flammable and forms azeotropes with a wide range of materials.

*"TMB" is a special formulation of Trimethoxyboroxine.

Write or phone for specific information on Trimethoxyboroxine and Methyl Borate.

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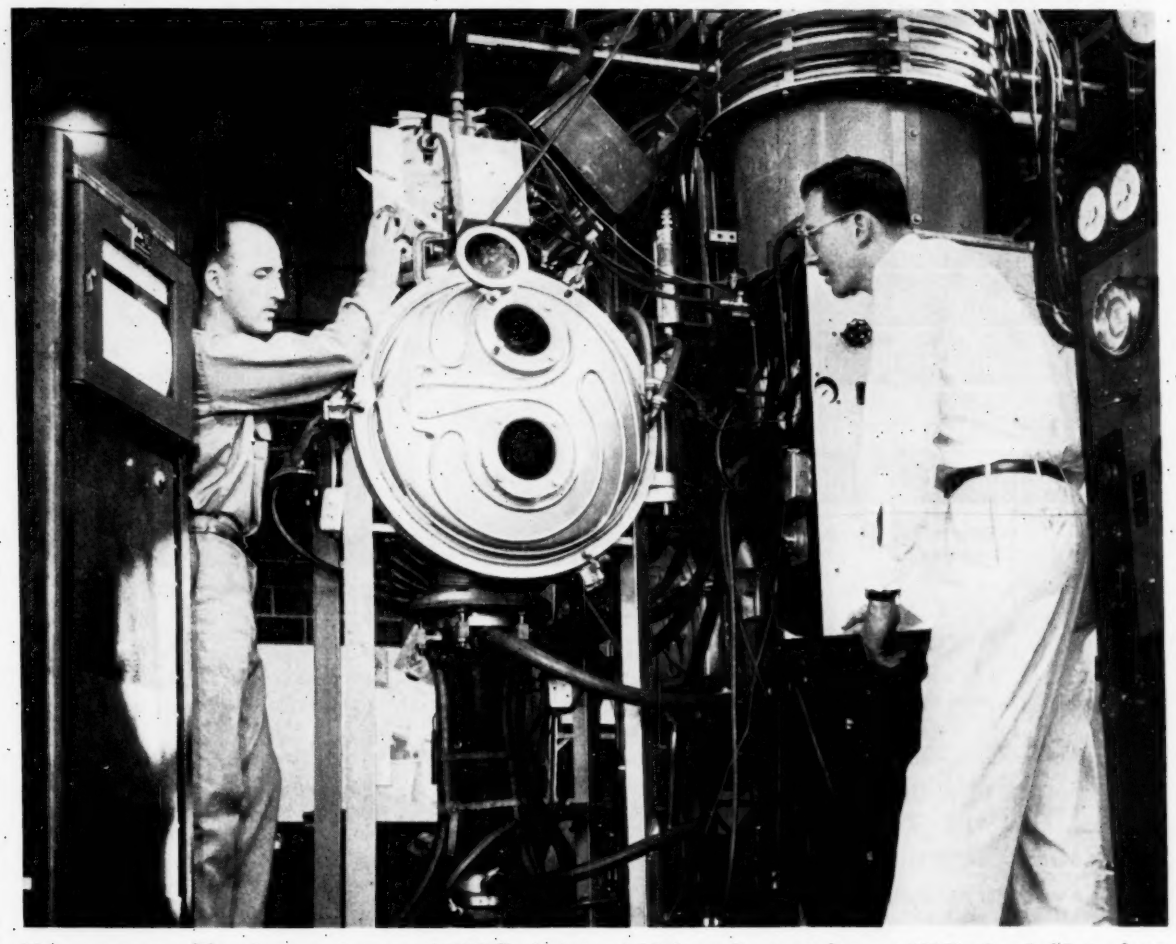


Vacuum-arc-melting furnace turns out 110-lb. ingots of high-purity tantalum at NRC's Cambridge plant.

Low-Pressure Way to High-Purity Tantalum

National Research Corp. is stepping-up production of high-purity tantalum this week to the full-rated capacity of its new 30,000-lbs./year plant at Cambridge, Mass. In operation since July 1, the plant employs completely new chemical and metallurgical techniques to turn out competitively priced tantalum ingots that, NRC claims, are of unprecedented size and purity.

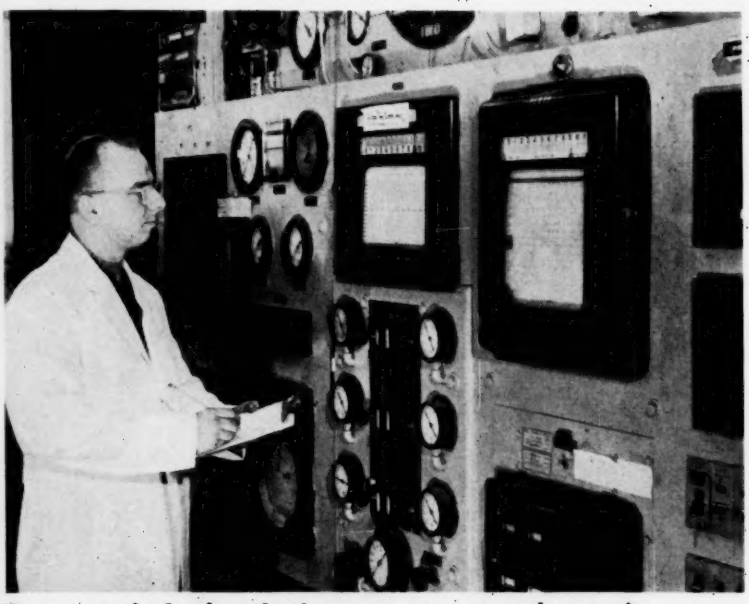
NRC's tantalum process is the product of an intensive two-year research project headed by James Gardner, assistant director of research. Twin keys to the process were developed jointly by the company's metallurgical group, led by senior research associate John Ham, and the chemistry group, under assistant director Lloyd Martin.

One key is the chemical refining method by which tantalite ore concentrates are reduced to high-purity powdered metal. NRC hasn't disclosed details of these chemical refining operations, says only that the process involves sodium reduction of a tantalum salt and is said to provide a high degree of convenience and flexibility for handling ore concentrates ranging from 20-70% tantalum (as the pentoxide, Ta_2O_5).

The high quality of metal powder, reportedly 3-5 times lower in oxygen, nitrogen and carbon than any other commercially available tantalum, is achieved by meticulous control at each step in the chemical process. NRC says it's the factor that permits high-purity ingots to be made by a single melt.

Unique feature of the second pivotal development, the vacuum-arc-melting process, is a pelletizing technique that eliminates sintering of the powdered metal into a consumable electrode. Tantalum powder is pressed into ¾-in.-diameter by ¾-in.-thick pellets, put into a feeder which is then vacuum-sealed.

After the entire furnace assembly is evacuated to about one micron of mercury pressure, the pellets are fed through an automatic escapement and form a column passing between two electrical contacts. Current passing

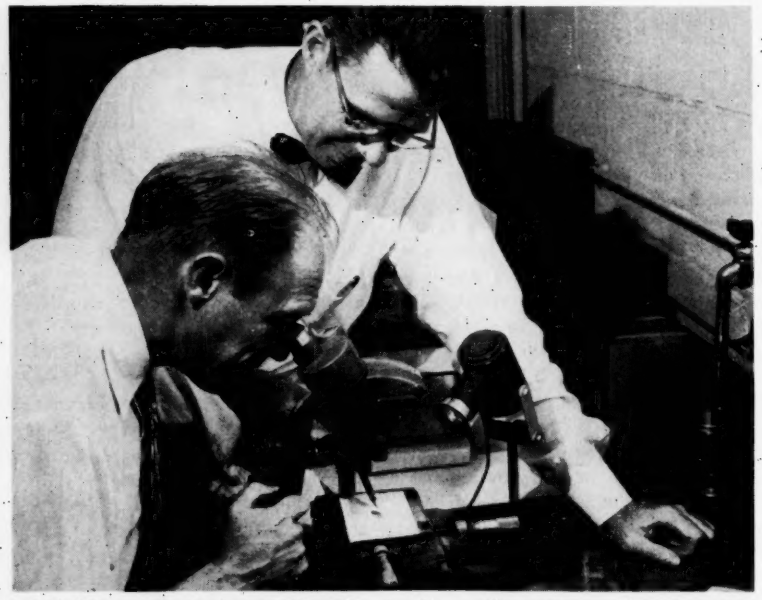


Close control of salt reduction guarantees tantalum purity.

through the column of pellets resistance-welds them into an electrode that is then fed down into the melting arc at the rate of 2-2½ lbs./min. Some degassing occurs during the electrode welding step.

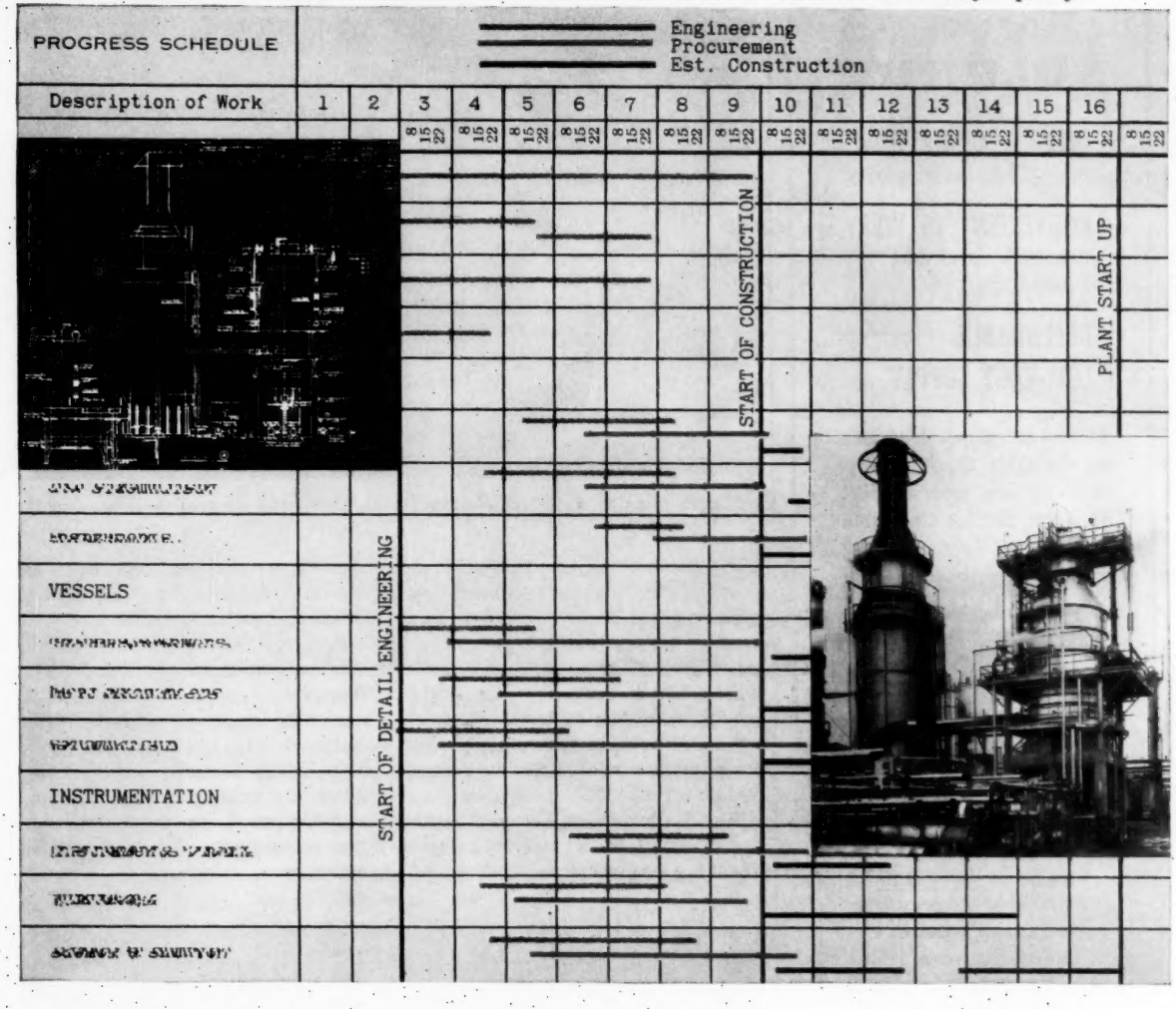
With the exception of this electrode-forming operation, the vacuum-arc-melting furnace is similar to other commercial industrial high-vacuum furnaces. Metal arc-melted from the welded-pellet electrode drops into a water-cooled crucible, is removed after cooling for about one hour (it is then 300-400 F).

Step Saver: An advantage of starting with extremely pure tantalum powder, says NRC, is that it eliminates the need for rerefining by more involved solid-state techniques. Other methods of consolidating the powdered metal into ingots—e.g., by elec-



NRC's Ham (seated) and Martin check quality of powdered metal.

Blaw-Knox builds vacuum unit for Ashland Oil.
Located at Canton, Ohio, this unit processes 15,000 barrels a day . . . proficiently reduces carbon content in cat cracker feedstocks . . . boosts overall refinery capacity.



From plans . . . to scheduling . . . to operation integrated construction pays off three times in two years

By placing this vacuum unit on stream on time, Blaw-Knox completes its third project for Ashland Oil and Refining Company. Within the past two years Blaw-Knox has also engineered and constructed two catalytic reforming and hydrogen desulfurization units for this expanding company. Each of these units was producing at capacity, on schedule, and within the budget requirements.

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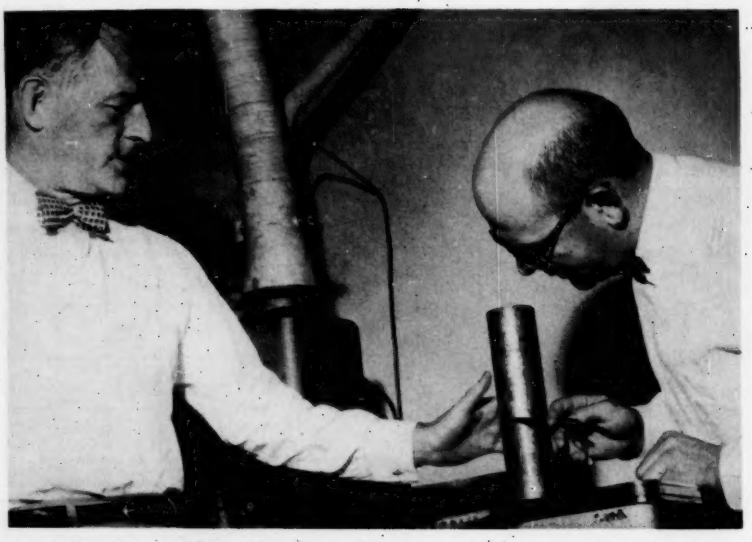
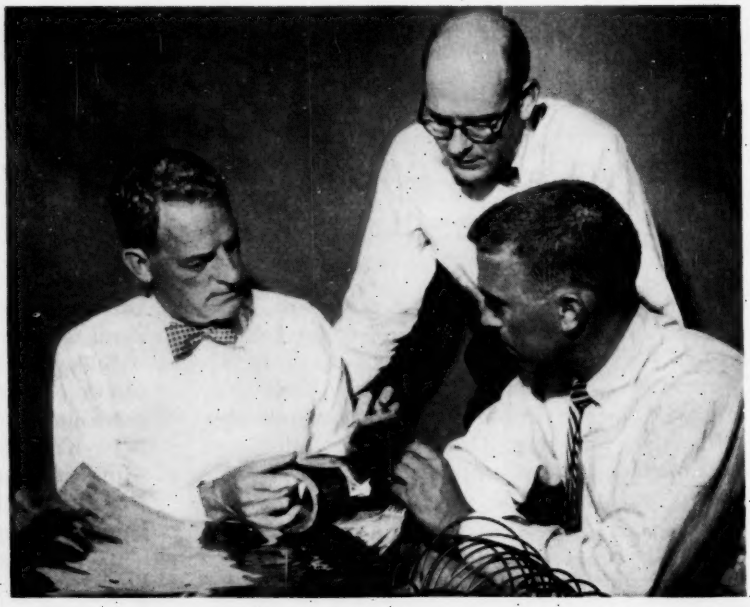


NRC President Richard Morse (left), Gardner examine 3-in. ingot.

tron-beam melting—could also be employed, but are not required for achieving high purity in the finished product. NRC's present system turns out ingots of up to 110 lbs., could make 150-lb. ingots with slight modification. And by moderate scale-up of furnace equipment, says the company, it would be feasible to cast 500-lb. ingots.

Plus in Properties: The most significant advantage of high-purity tantalum to equipment fabricators and users is its high ductility. The 3-in. ingots have low hardness (60-65 Brinell), can be reduced easily to sheet or to half-mil-thick foil without intermediate annealing. This ease of fabrication, coupled with the large size of the ingots, simplifies the manufacture of large-size processing equipment which formerly required considerable welding of smaller-size tantalum sheet stock. Further, the high-purity metal is easier to weld, minimizes intergranular corrosion



Sales manager Ken Geiger (right) joins in checking the products.

caused by impurities in weld areas.

The improved purity is also important to the electronics industry—a major consumer of tantalum foil, which goes into electrolytic capacitors. High-purity tantalum appears to have greatly superior leakage characteristics, is currently being evaluated by several capacitor manufacturers, says NRC.

An unexpected market, but one which NRC believes may become a sizable one, is the nuclear industry. Several AEC laboratories have purchased NRC's high-purity tantalum to check its potential as a corrosion-resistant material for construction of such things as liquid-metal-cooled reactor systems.

Future Expansion: To fill orders for tantalum in finished forms — foil, sheet, tubing, rods, wire — NRC is now working with several well-known fabricators of rare and reactive metals. The company has no desire to enter this end of the business, plans to sell its high-purity tantalum in ingot or powder form. Fabricators interested in producing their own ingots from powder can purchase vacuum-arc-melting furnace equipment made by NRC Equipment Corp. (Newton, Mass.)

As for its own plans, the company is already taking steps to greatly increase its production capacity. It has a year's supply of ore on hand, has established reliable sources in the major mining areas in Central Africa, Western Australia and Brazil.

NRC's long-range prediction: a rough doubling of tantalum markets "each year for the next several years."

Shale Oil Progress

A report last week by Denver Research Institute scientists on the technological progress of the Aspeco oil shale retorting process (*CW, June 23, '56, p. 60*) shed new light on the economic feasibility of recovering the nation's vast reserves of shale oil. Coupled with the simultaneous announcement of a proposed offering of convertible debentures by The Oil Shale Corp. (Carson City, Nev.), owner of the Aspeco process and sponsor of the DRI research project, the report makes shale oil's commercial prospects appear considerably brighter than recent setbacks might indicate (*CW, July 12, p. 22*).

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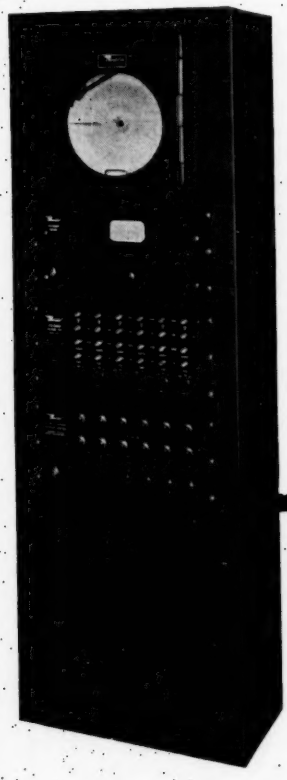

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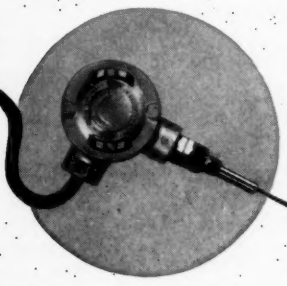

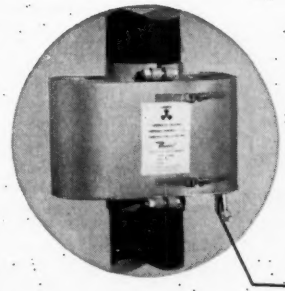

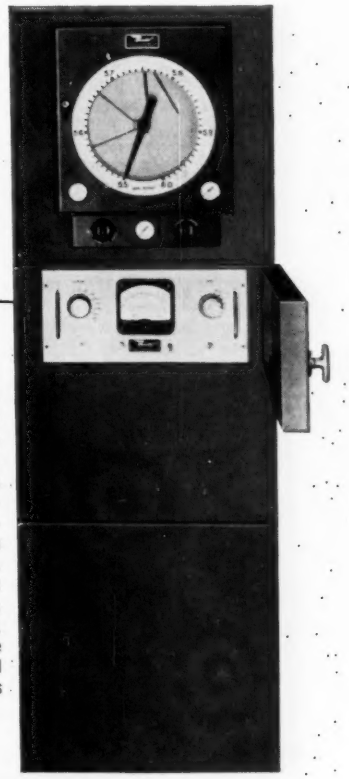

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Source of the data disclosed by DRI is a 24-tons/day Aspeco pilot plant that has been operated for more than nine months at Denver, Colo. Basically, the plant features a horizontal retort from which air is excluded. In this, crushed oil shale is tumbled with thermospheres (heated steel balls were used originally, were later replaced by ceramic balls). Thermal decomposition of the shale's organic content (kerogen) produces a mixture of gaseous and vaporized liquid hydrocarbons from which the shale oil is condensed.

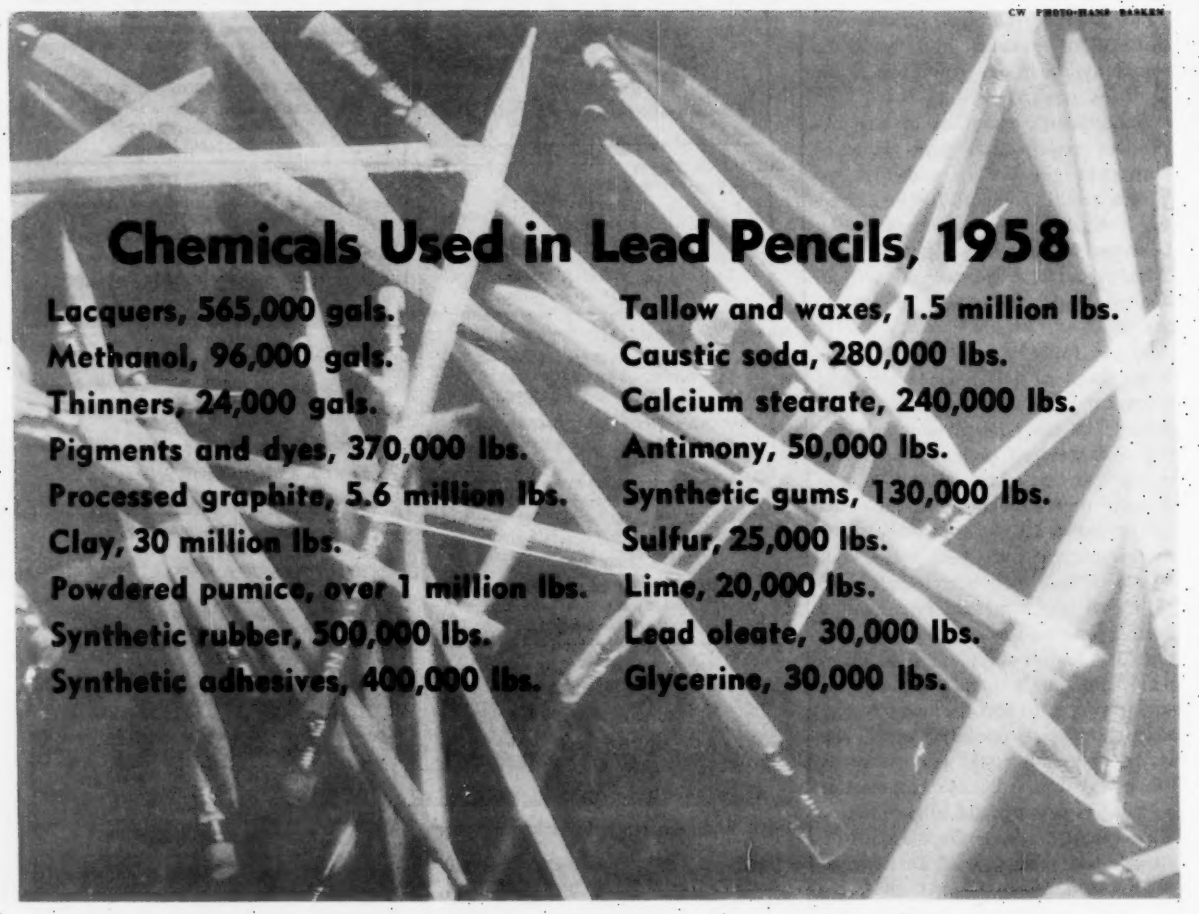
Subsequent separation of the by-product retort gases yield liquefied petroleum gas (LPG), and fuel gas with a heating value of 700-800 btu./cu. ft. Carbon remaining in the shale-coke residue is burned to reheat the thermospheres, produces more than enough by-product power to operate the plant.

More Study Ahead: Dr. Charles Prien, head of DRI's Chemistry and Chemical Engineering Division, reported that the pilot plant is now being re-engineered to increase its efficiency and ease of operation. Changes include replacement of screw- and bucket-conveying systems to move the thermospheres with pneumatic conveyors. It will then be retested.

Logical next step, said Prien, would be the construction of a 1,200-2,400-tons/day semiworks plant to confirm pilot-plant data and to establish such engineering variables as maintenance, wear and general operating costs. The semiworks plant could later serve as the basis of a full-scale commercial plant consisting of 8-16 such units.

Economic Outlook: On the basis of present test results, DRI Director S. A. Johnson estimates that shale oil produced in Colorado could be delivered to West Coast refineries at costs of $1.42-$1.92/bbl., exclusive of profit. (California crude now goes for about $3.00-$3.25/bbl.) In the future, predicted Johnson, shale oil will be produced more cheaply than domestic petroleum. His reasons: crude oil exploration and drilling costs are bound to rise; shale technology is just as certain to improve.

A U.S. shale oil industry is economically feasible at the present time, said Johnson. And shale oil production as high as 1 million bbls./day in the period from 1970 on "would be quite reasonable."



Pencil Makers Draw Up '58 Chemical List

Sizeable and steady customers for chemical products are the makers of conventional lead pencils. Geared up to produce an estimated 10 million gross of writing units this year, pencil makers will require a host of chemicals, says the Lead Pencil Manufacturers Assn.

Lacquers probably form one of the largest needs; about 565,000 gals. will be used this year. Nitrocellulose lacquers are most widely employed—roughly 200,000 gals. will be needed in '58.

Pencil makers will also require 370,000 lbs. of dyes and pigments. Red is the dominant color—80,000 lbs. of it will be used. Other important coloring agents: blue, (70,000 lbs.); methyl violet, (50,000 lbs.); yellow, (40,000 lbs.); orange, (25,000 lbs.); carbon black, (20,000 lbs.); white, (12,000 lbs.).

Other chemicals which will be channeled into the production of lead pencils this year include synthetic gums, (130,000 lbs.); antimony, (50,000 lbs.); lead oleate, (30,000 lbs.); glycerine, (30,000 lbs.); sulfur, (25,000 lbs.); lime, (20,000 lbs.).

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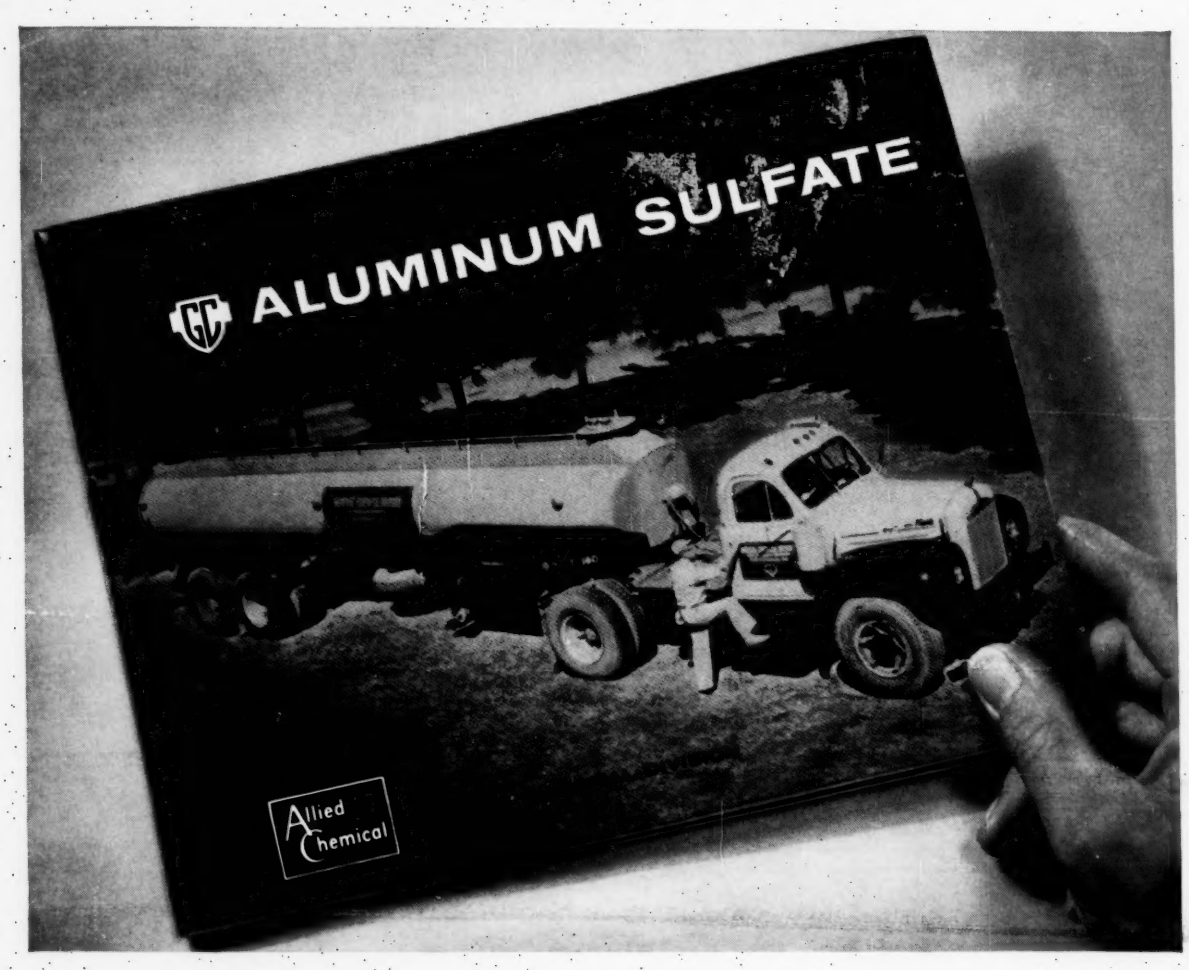

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